

Annex15: List of Training Courses each Category

(1)The Number of Participation of each Category

| Category of Training Courses | Title of Training Courses Conducted within TSC3 Project | No.of times | No. of trainees | | | | | | |
|---|---|-------------|-----------------|----------|----------|----------|----------|----------|----|
| | | | JFY 2009 | JFY 2010 | JFY 2011 | JFY 2012 | JFY 2013 | JFY 2014 | |
| New Comer | Training Course for Newly Recruited Staffs of MOWRAM | | | | | | | | |
| Advanced | 1 Canal Works | 2 | | | 20 | 20 | | | |
| | 2 Reservoir | 1 | | | | 20 | | | |
| | 3 Head Works | 1 | | | | | 20 | | |
| | 4 Soil and Concrete Tests and Analysis | 3 | | | | 18 | 20 | 30 | |
| Basic | 1 Route & Topographic Survey by Auto Level, Total Station | 3 | 12 | | 10 | 20 | | | |
| | 2 Hydrology, Meteorology & Crop Water Requirement & Irrigation Planning | 3 | | 21 | 20 | 26 | | | |
| | 3 Irrigation Planning by GIS | 2 | 17 | | | | | | 20 |
| | 4 Hydraulic Design of Irrigation System | | | | | | | | |
| | a. Hydraulic Design of Irrigation System | 2 | | 20 | | | | 20 | |
| | b. Drawing & Cost Estimation of Irrigation Facilities by Excel/AutoCAD | 1 | | 20 | | | | | |
| | 5 Construction Management & Supervision | 6 | | 20 | 38 | 19 | 20 | 19 | |
| | 6 Participatory Irrigation Management | | | | | | | | |
| | a. Construction and Rehabilitation of Irrigation System | 5 | | 20 | 20 | 20 | 20 | 29 | |
| | b. Operation and Maintenance | 3 | | | 20 | 20 | 19 | | |
| c. Organizational Management of FWUC/FWUG | 0 | | | | | | | | |
| River Basin | 1 a Accurate Data Collection Methodology for Agricultural River Basin Planning by Remote Sensing & GIS(1) | 6 | 32 | 22 | 39 | 20 | 19 | | |
| | b Accurate Data Collection Methodology for Agricultural River Basin Planning by Remote Sensing and GIS (II) | 4 | | 12 | 12 | 20 | 20 | | |
| | 2 Basin-wide Irrigation Planning | 7 | | | 12 | 20 | 69 | 30 | |
| | 3 Analysis and Monitoring of Water Balance for ARBM&D | 2 | | | | 20 | 20 | | |
| | 4 Enhancement of Agricultural Extension Service in collaborate with APPP | 3 | | | | 20 | 20 | 20 | |
| Total | | 54 | 61 | 135 | 191 | 263 | 267 | 148 | |

(2)Implemented training courses in TSC (MOWRAM)

| No. | Administration No. | Title of training courses | Date | category | No. of Trainee | Trainer |
|-----------------|--------------------|--|--------------------------|----------|----------------|---|
| JFY 2009 | | | | | | |
| 1 | 1 | Methodology of Accurate Data Collection on Survey with GIS and GPS Technology for ARBM&D | 2009.11.16 2009.11.27 | R-1-a | 32 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Vutha |
| 2 | 1 | Irrigation Planning by GIS | 2010.02.08 2010.02.19 | B-3 | 17 | Mr.Hing, Mr.Seng |
| 3 | 2 | Topographic and Route Survey | 3010.03.01 2010.03.26 | B-1 | 12 | Mr.Hing, Mr.Seng, Mr.Savoeun, Mr.Bunthoeun, Mr.Vutha |
| JFY 2010 | | | | | | |
| 4 | 3 | Hydraulic Design for Irrigation Canal and Canal Structure | 2010.06.21 2010.06.25 | B-4-a | 20 | Mr.Savoeun, Mr.Bunthoeun, Mr.Vutha, Mr.Ena |
| 5 | 4 | Participation of farmers for Sustainable Irrigation System Management | 2010.07.19 2010.07.23 | B-6-a | 20 | Mr.Vannarith, Mr.Korn |
| 6 | 5 | Hydrology, Meteorology & Crop Water Requirement Survey and Irrigation Planning | 2010.09.27 2010.10.05 | B-2 | 21 | Mr.Hing, Mr.Seng, Mr.Y.Sotha, Mr.Savoeun |
| 7 | 6 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS(I) | 2010.11.02 2010.11.12 | R-1-a | 22 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Y.Sotha, Mr.Savoeun |
| 8 | 7 | Cost Estimation of Irrigation Canal and Canal Structure | 2010.11.15 2010.11.19 | B-4-b | 20 | Ms.Senny, Mr.Bunthoeun, Mr.Vutha |
| 9 | 8 | Construction Management | 2010.11.29 2010.12.03 | B-5 | 20 | Mr.Vannarith, Mr.Ena, Mr.S.Sotha, Mr.Korn |
| 10 | 9 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS(II) | 2010.12.06 2010.12.24 | R-1-b | 12 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Y.Sotha, Mr.Savoeun |
| JFY 2011 | | | | | | |
| 11 | 10 | Supervision on Construction Site | 2011.04.27 2011.04.29 | B-5 | 20 | Mr.Vannarith, Mr.Ena, Mr.S.Sotha |
| 12 | 11 | Basin-wide Irrigation Planning | 2011.06.27 2011.06.29 | R-2 | 12 | Mr.Hing, Mr.Y.Sotha, Mr.Savoeun |
| 13 | 12 | Participation of farmers for Sustainable Irrigation System Management | 2011.07.25 2011.07.29 | B-6-a | 20 | Mr.Vannarith, Mr.S.Sotha, Mr.Korn |
| 14 | 13 | Accurate Data Collection methodology for ARB Planning by Remote Sensing and GIS(I) | 2011.08.15 2011.08.19 | R-1-a | 20 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Savoeun |
| 15 | 14 | Hydrology, Meteorology & Crop Water Requirement Survey and Irrigation Planning | 2011.08.29 2011.09.09 | B-2 | 20 | Mr.Hing, Mr.Seng, Mr.Savoeun |
| 16 | 15 | Operation and Maintenance of Irrigation Facilities | 2011.10.10 2011.10.21 | B-6-b | 20 | Ms.Senny, Mr.Vannarith, Mr.Ena, Mr.S.Sotha, Mr.Korn |
| 17 | 16 | Advanced Design for Irrigation Canal and Related Structure | 2011.11.14 2011.11.25 | A-1 | 20 | Mr.Hing, Mr.Savoeun, Mr.Vutha, Mr.Bunthoeun |
| 18 | 17 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS(II) | 2011.11.28 2011.12.16 | R-1-b | 12 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Y.Sotha, Mr.Savoeun |
| 19 | 18 | Topographic Survey for Drawing of Plane | 2012.02.27 2012.03.02 | B-1 | 10 | Mr.Manabu Kawaguchi |
| 20 | 19 | Supervision on Construction Site | 2012.03.19 2012.03.23 | B-5 | 18 | Mr.Vannarith, Mr.Ena |
| 21 | 20 | Methodology of Remote Sensing for Agriculture River Basin Planning | 2012.03.26 2012.03.30 | R-1-a | 19 | Mr.Hing, Ms.Senny |
| JFY 2012 | | | | | | |
| 22 | 21 | Accurate Data Collection Methodology for ARB Planning by using Remote Sensing and GIS Technology | 2012.09.25 2012.10.05 | R-1-a | 20 | Mr.Seng, Ms. Senny, Mr.Savoeun |
| 23 | 22 | Basin-wide Irrigation Planning | 2012.10.08 2012.10.12 | R-2 | 20 | Mr.Hing, Ms. Senny, Mr.Y.Sotha, Mr.Savoeun |
| 24 | 23 | Discharge Measurement | 2012.10.22 2012.10.26 | R-3 | 20 | Mr.Seng, Mr.Y.Sotha, Mr.Savoeun, Mr.S.Sotha |
| 25 | 24 | Hydrology, Meteorology & Crop Water Requirement Survey and Irrigation Planning | 2012.11.05 2012.11.16 | B-2 | 26 | Mr.Hing, Mr.Y.Sotha, Mr.Savoeun, Mr.Ena |
| 26 | 25 | Participation of farmers for Sustainable Irrigation System Management | 2012.12.03 2012.12.07 | B-6-a | 20 | Mr.Senny, Mr.Vannarith, Mr.Ena, Mr.S.Sotha, Mr.Korn, Mr.Kanthei |

| No. | Administration No. | Title of training courses | Date | category | No. of Trainee | Trainer |
|-----|--------------------|---|--------------------------|----------|----------------|--|
| 27 | 26 | Advanced Design of Reservoir | 2012.12.11 2012.12.21 | A-2 | 20 | Mr.Bunthoeun, Mr. Vutha |
| 28 | 27 | Construction Management and Supervision | 2012.12.24 2012.12.28 | B-5 | 19 | Ms. Senny, Mr. Vannarith, Mr.Ena |
| 29 | 28 | Enhancement of Agriculture Extension with Rice Cultivation Technology | 2012.12.31 2013.01.04 | R-4 | 20 | Ms.Senny, Mr.Ena, Mr.S.Sotha, Mr.Korn |
| 30 | 29 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS(II) | 2013.01.08 2013.01.25 | R-1-b | 20 | Mr.Seng, Ms.Senny |
| 31 | 30 | Advanced Design for Irrigation Canal and Related Facilities | 2013.01.28 2013.02.08 | A-1-a | 20 | Mr.Bunthoeun, Mr. Vutha |
| 32 | 31 | Topographic and Route Survey | 2013.02.11 2013.03.01 | B-1 | 20 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Y.Sotha, Mr.Savoeun |
| 33 | 32 | Operation and Maintenance of Irrigation System | 2013.03.04 2013.03.07 | B-6-b | 20 | Mr.S.Sotha, Mr.Kantheh |
| 34 | 33 | Soil and Concrete Test and Analysis | 2013.03.11 2013.03.21 | A-4 | 18 | Mr.Bunthoeun, Mr. Vutha, Mr. Vannarith, Mr.Ena |

JFY 2013

| | | | | | | |
|----|----|--|--------------------------|-------|----|--|
| 35 | | Water Balance Calculation | 2013.04.22 2013.04.25 | R-2 | 13 | Mr.Hiraiwa |
| 36 | 34 | Accurate Data Collection Methodology for ARB Planning by using Remote Sensing and GIS Technology | 2013.06.04 2013.06.14 | R-1-a | 19 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Y.Sotha |
| 37 | 35 | Enhancement of Agriculture Extension Service with Rice Cultivation Technology | 2013.06.24 2013.06.28 | R-4 | 20 | Ms.Senny, Mr.Ena, Mr.S.Sotha, Mr.Korn |
| 38 | 36 | Discharge Measurement | 2013.07.08 2013.07.12 | R-3 | 20 | Mr.Y.Sotha, Mr.Ena |
| 39 | 37 | River Basin Water Balance | 2013.07.15 2013.07.18 | R-2 | 17 | Mr.Hiraiwa |
| 40 | 38 | Operation and Maintenance of Irrigation Facilities | 2013.08.05 2013.08.09 | B-6-b | 19 | Mr.Bunthoeun, Mr. Vannarith, Mr.S.Sotha, Mr.Korn, Mr.Kantheh |
| 41 | 39 | Basin-wide Irrigation Planning | 2013.08.12 2013.08.16 | R-2 | 19 | Mr.Seng, Mr.Y.Sotha, Mr.Savoeun, Mr.Ena |
| 42 | 40 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS Technology | 2013.09.02 2013.09.13 | R-1-b | 20 | Mr.Seng, Ms.Senny, Mr.Y.Sotha, Mr.Savoeun |
| 43 | 41 | Participation of Farmers for Sustainable Irrigation System Management | 2013.10.08 2013.10.11 | B-6-a | 20 | Ms.Senny, Mr.S.Sotha, Mr.Korn, Mr.Kantheh |
| 44 | 42 | Hydraulic Design for Irrigation Canal and Canal Structure | 2013.11.04 2013.11.08 | B-4-a | 20 | Mr.Seng, Mr.Savoeun, Mr.Bunthoeun, Mr.Vutha |
| 45 | 43 | Construction Management and Supervision | 2013.11.25 2013.11.29 | B-5 | 20 | Ms.Senny, Mr. Vannarith, Mr.Ena |
| 46 | 44 | Basin-wide Irrigation Planning | 2013.12.16 2013.12.27 | R-2 | 20 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Y.Sotha, Mr.Savoeun |
| 47 | 45 | Soil and Concrete | 2014.01.20 2014.01.24 | A-4 | 20 | Mr.Seng, Mr.Bunthoeun, Mr.Vutha, Mr. Vannarith |
| 48 | 46 | Advanced Design for Head Works | 2014.03.03 2014.03.21 | A-3 | 20 | Mr.Seng, Mr.Bunthoeun, Mr.Vutha |

JFY 2014

| | | | | | | |
|----|----|---|--------------------------|-------|----|--|
| 49 | 47 | Construction Management & Supervision | 2014.04.21 2014.04.25 | B-5 | 19 | Mr.Seng, Mr.Bunthoeun, Mr.Vutha, Mr. Vannarith, Mr.Ena |
| 50 | 48 | Agricultural Extension Service with Rice Cultivation Technology | 2014.05.05 2014.05.09 | R-4 | 20 | Ms.Senny, Mr.Ena, Mr.S.Sotha, Mr.Korn |
| 51 | 49 | Irrigation Planning by GIS | 2014.05.19 2014.05.30 | B-3 | 20 | Mr.Hing, Mr.Seng, Ms.Senny, Mr.Savoeun |
| 52 | 50 | Soil and Concrete Test and Analysis | 2014.06.03 2014.06.13 | A-4 | 30 | Mr.Bunthoeun, Mr.Vutha, Mr. Vannarith, Mr.Ena |
| 53 | 51 | Participation of Farmers for Sustainable Irrigation System Management | 2014.06.23 2014.06.27 | B-6-a | 29 | Mr.S.Sotha, Mr.Korn, Mr.Kantheh |
| 54 | 52 | River Basin Water Resources Analysis | 2014.06.30 2014.06.11 | R-2 | 30 | Mr.Hing, Mr.Seng, Mr.Y.Sotha, Mr.Savoeun, Mr.Ena |

ANNEX 16 : Evaluation Result of Training Courses

| No. | Name of Training Course | Period | Participant | Test (100 point) | | Technical Level Up (5 degree) | | Satisfaction of Training Course | | Utilization of Technical Learning | |
|-----|--|---------------------------|-------------|------------------|-------------------------|--|--|---------------------------------|--------------------------------|-----------------------------------|-------------------------------|
| | | | | Average of Point | Ratio of over the Point | Average of Technical Level Up (Degree) | Ratio of over the 1 degree Technical Level | Average | Ratio of over 75% Satisfaction | Average | Ratio of over 75% Utilization |
| 1 | Methodology of Accurate Data Collection on Survey with GIS and GPS Technology for ARBM&D | 2009.11.16~ 2009.11.27 | 32 | 71.7 | 95.0% | 1.20 | 90.0% | 91.9% | 96.8% | 85.3% | 86.2% |
| 2 | Irrigation Planning by GIS | 2010.02.08~ 2010.02.19 | 17 | 77.9 | 82.4% | 1.35 | 94.1% | 90.6% | 93.8% | 82.1% | 85.7% |
| 3 | Topographic and Route Survey | 2010.03.01~ 2010.03.26 | 12 | 77.5 | 100% | 1.05 | 90.9% | 87.5% | 91.7% | 75.0% | 75.0% |
| 4 | Hydraulic Design for Irrigation Canal and Canal structure | 2010.06.21~ 2010.06.25 | 20 | 82.8 | 100% | 1.87 | 100% | 94.4% | 100% | 88.2% | 94.7% |
| 5 | Participation of Farmers for Sustainable Irrigation System Management | 2010.07.19~ 2010.07.23 | 20 | — | — | 1.63 | 95.0% | 95.0% | 100% | 85.0% | 80.0% |
| 6 | Hydrology, Meteorology & Crop Water Requirement Survey and Irrigation Planning | 2010.09.27~ 2010.10.05 | 21 | 78.1 | 100% | 1.52 | 85.7% | 88.2% | 100.0% | 86.8% | 90.0% |
| 7 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS (I) | 2010.11.02~ 2010.11.12 | 22 | 50.2 | 22.7% | 1.23 | 63.6% | 79.8% | 90.5% | 85.5% | 89.4% |
| 8 | Cost Estimation of Irrigation Canal and Canal Structure | 2010.11.15~ 2010.11.19 | 20 | — | — | 1.41 | 95.0% | 90.0% | 95.0% | 77.6% | 80.0% |
| 9 | Construction Management | 2010.11.29~ 2010.12.03 | 20 | 93.3 | 100% | 1.12 | 73.7% | 85.5% | 89.5% | 82.9% | 89.5% |
| 10 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS (I) | 2010.12.06~ 2010.12.24 | 12 | 80.5 | 100% | 1.48 | 100% | 87.5% | 100% | 85.4% | 100% |
| 11 | Supervision on Construction Site | 2011.04.27~ 2011.04.29 | 20 | 99.5 | 100% | 1.16 | 90.0% | 91.3% | 95.0% | 88.8% | 95.0% |
| 12 | Basin-wide Irrigation Planning | 2011.06.27~ 2011.06.30 | 12 | 91.7 | 100% | 1.40 | 91.6% | 100% | 100% | 81.3% | 75.0% |
| 13 | Participation of Farmers for Sustainable Irrigation System Management | 2011.07.25~ 2011.07.29 | 20 | 88.0 | 100% | 1.03 | 70.0% | 86.3% | 90.0% | 90.0% | 100% |
| 14 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS (I) | 2011.08.08~ 2011.08.19 | 20 | 68.5 | 85.0% | 1.10 | 65.0% | 79.8% | 94.7% | 90.0% | 95.0% |
| 15 | Hydrology, Meteorology & Crop Water Requirement Survey and Irrigation Planning | 2011.08.29~ 2011.09.09 | 20 | 82.9 | 100% | 1.32 | 95.0% | 95.0% | 100% | 73.5% | 60.0% |
| 16 | Operation and Maintenance of Irrigation Facilities | 2011.10.10~ 2011.10.21 | 20 | 79.3 | 100% | 1.03 | 70.0% | 95.0% | 100% | 91.3% | 100% |
| 17 | Advanced Design for Irrigation Canal and Related Structure | 2011.11.14~ 2011.11.25 | 20 | — | — | 1.39 | 85.0% | 91.3% | 100% | 85.5% | 94.7% |
| 18 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS (II) | 2011.11.28~ 2011.12.16 | 12 | 86.8 | 100% | 1.20 | 92.9% | 86.5% | 92.3% | 83.3% | 83.3% |
| 19 | Topographic Survey for Drawing of Plane | 2012.02.27~ 2012.03.02 | 10 | 80.0 | 100% | 1.48 | 90.0% | 90.0% | 90.0% | 85.0% | 80.0% |
| 20 | Supervision on Construction Site | 2012.03.19~ 2012.03.23 | 18 | 95.5 | 100% | 1.61 | 100% | 90.3% | 94.4% | 80.6% | 77.7% |
| 21 | Methodology of Remote Sensing for Agricultural River Basin Planning | 2012.03.26~ 2012.03.30 | 19 | 87.9 | 100% | 1.58 | 94.7% | 78.9% | 94.7% | 72.4% | 55.5% |

| No. | Name of Training Course | Period | Participant | Test (100 point) | | Technical Level Up (5 degree) | | Satisfaction of Training Course | | Utilization of Technical Learning | |
|-----|--|-----------------------|-------------|------------------|-------------------------|--|--|---------------------------------|--------------------------------|-----------------------------------|-------------------------------|
| | | | | Average of Point | Ratio of over the Point | Average of Technical Level Up (Degree) | Ratio of over the 1 degree Technical Level | Average | Ratio of over 75% Satisfaction | Average | Ratio of over 75% Utilization |
| 22 | Accurate Data Collection Methodology for ARB Planning by using Remote Sensing and GIS Technology | 2012.09.25~2012.10.05 | 20 | 56.4 | 55% | 1.23 | 75.0% | 91.7% | 90.0% | 81.6% | 70.0% |
| 23 | Basin-wide Irrigation Planning | 2012.10.08~2012.10.12 | 20 | 84.2 | 100% | 1.28 | 75.0% | 95.0% | 100.0% | 86.3% | 80.0% |
| 24 | Discharge Measurement | 2012.10.22~2012.10.26 | 20 | 79.5 | 100% | 1.67 | 100.0% | 92.5% | 90.0% | 91.3% | 95.0% |
| 25 | Hydrology, Meteorology & Crop Water Requirement Survey and Irrigation Planning | 2012.11.05~2012.11.16 | 26 | 71.1 | 96% | 1.57 | 92.3% | 94.2% | 100.0% | 81.5% | 88.4% |
| 26 | Participation of Farmers for Sustainable Irrigation System Management | 2012.12.03~2012.12.07 | 20 | 68.2 | 80% | 1.50 | 100.0% | 92.5% | 100.0% | 77.5% | 80.0% |
| 27 | Advanced Design of Reservoir | 2012.12.11~2012.12.21 | 20 | 68.0 | 100% | 1.32 | 95.0% | 93.4% | 95.0% | 88.8% | 90.0% |
| 28 | Construction Management and Supervision | 2012.12.24~2012.12.28 | 19 | 93.4 | 100% | 1.55 | 100% | 92.1% | 100% | 81.9% | 84.2% |
| 29 | Enhancement of Agricultural Extension Service with Rice Cultivation Technology | 2012.12.31~2013.01.04 | 20 | 83.5 | 100% | 1.90 | 100% | 95.0% | 100% | 77.5% | 80.0% |
| 30 | Accurate Data Collection Methodology for ARB Planning by Remote Sensing and GIS (II) | 2013.01.08~2013.01.25 | 20 | 88.0 | 100% | 1.56 | 90.0% | 93.8% | 100% | 80.0% | 85.0% |
| 31 | Advanced Design for Irrigation Canal and Related Facilities | 2013.01.28~2013.02.08 | 20 | 78.0 | 100% | 1.37 | 80.0% | 90.0% | 100.0% | 85.5% | 90.0% |
| 32 | Topographic and Route Survey | 2013.02.11~2013.03.01 | 20 | 87.2 | 90.0% | 1.45 | 75.0% | 90.8% | 85.0% | 73.6% | 60.0% |
| 33 | Operation and Maintenance of Irrigation System | 2013.03.04~2013.03.07 | 20 | 79.0 | 95.0% | 1.40 | 85.0% | 95.0% | 100% | 78.8% | 80.0% |
| 34 | Soil and Concrete Test and Analysis | 2013.03.11~2013.03.21 | 18 | 70.1 | 94.4% | 1.32 | 100% | 84.7% | 94.4% | 69.4% | 66.6% |
| 35 | Accurate Data Collection Methodology for ARB Planning by using Remote Sensing and GIS Technology | 2013.06.04~2013.06.14 | 19 | 73.1 | 89.4% | 1.30 | 89.4% | 96.1% | 100% | 85.5% | 78.9% |
| 36 | Enhancement of Agricultural Extension Service with Rice Cultivation Technology | 2013.06.24~2013.06.28 | 20 | 83.1 | 100% | 2.01 | 89.4% | 95.0% | 90.0% | 77.5% | 95.0% |
| 37 | Discharge Measurement | 2013.07.08~2013.07.12 | 20 | 69.5 | 75.0% | 1.88 | 100% | 96.3% | 100% | 78.9% | 78.9% |
| 38 | Operation and Maintenance of Irrigation Facilities | 2013.08.05~2013.08.09 | 19 | 72.0 | 100% | 1.66 | 100% | 93.4% | 90.0% | 80.3% | 75.0% |
| 39 | Basin-wide Irrigation Planning | 2013.08.12~2013.08.16 | 19 | 65 | 68.4% | 1.36 | 94.7% | 92.1% | 100% | 77.6% | 68.4% |
| 40 | Accurate Data Collection Methodology for ARB Planning by using Remote Sensing and GIS Technology | 2013.09.02~2013.09.13 | 20 | 70.8 | 84.2% | 1.16 | 84.2% | 92.1% | 100% | 77.6% | 78.9% |
| 41 | Participation of Farmers for Sustainable Irrigation System Management | 2013.10.08~2013.10.11 | 20 | 73.5 | 80.0% | 1.70 | 100.0% | 95.0% | 100.0% | 85.0% | 90.0% |
| 42 | Hydraulic Design for Irrigation Canal and Canal structure | 2013.11.04~2013.11.08 | 20 | 82 | 100.0% | 1.92 | 95.0% | 90.0% | 90.0% | 90.0% | 90.0% |
| 43 | Construction Management and Supervision | 2013.11.25~2013.11.29 | 20 | 92.85 | 100.0% | 1.65 | 100.0% | 92.5% | 100.0% | 78.8% | 80.0% |
| 44 | Basin-wide Irrigation Planning | 2013.12.16~2013.12.27 | 20 | 73 | 85.0% | 1.72 | 95.0% | 91.2% | 100.0% | 87.5% | 95.0% |

| No. | Name of Training Course | Period | Participant | Test (100 point) | | Technical Level Up (5 degree) | | Satisfaction of Training Course | | Utilization of Technical Learning | |
|-----|---|---------------------------|-------------|------------------|-------------------------|--|--|---------------------------------|--------------------------------|-----------------------------------|-------------------------------|
| | | | | Average of Point | Ratio of over the Point | Average of Technical Level Up (Degree) | Ratio of over the 1 degree Technical Level | Average | Ratio of over 75% Satisfaction | Average | Ratio of over 75% Utilization |
| 45 | Soil and Concrete Test and Analysis | 2014.01.20~ 2014.01.24 | 20 | 82 | 100.0% | 1.44 | 100.0% | 90.0% | 100.0% | 81.3% | 70.0% |
| 46 | Advanced Design for Head Works | 2014.03.03~ 2014.03.21 | 20 | 68 | 100.0% | 1.12 | 85.0% | 97.5% | 100.0% | 86.3% | 90.0% |
| 47 | Construction Management and Supervision | 2014.04.21~ 2014.04.25 | 19 | 92.52 | 100.0% | 1.59 | 100.0% | 90.8% | 100.0% | 85.5% | 94.7% |
| 48 | Agricultural Extension Service with Rice Cultivation Technology | 2014.05.05~ 2014.05.09 | 20 | 83.25 | 100.0% | 1.76 | 90.0% | 90.0% | 100.0% | 82.5% | 70.0% |
| 49 | Irrigation Planning by GIS | 2014.05.19~ 2014.05.30 | 18 | 72.5 | 95.0% | 1.42 | 90.0% | 93.8% | 95.0% | 82.5% | 85.0% |
| 50 | Soil and Concrete Test and Analysis | 2014.06.02~ 2014.06.13 | 28 | 83.27 | 100.0% | 1.43 | 96.7% | 89.2% | 86.7% | 84.2% | 86.7% |
| 51 | Participation of Farmers for Sustainable Irrigation System Management | 2014.06.23~ 2014.06.27 | 29 | 79.31 | 89.6% | 1.46 | 96.5% | 90.8% | 96.5% | 79.4% | 82.3% |
| 52 | River Basin Water Resources Analysis | 2014.06.30~ 2014.07.10 | 30 | 81.03 | 96.6% | 1.30 | 93.3% | 86.2% | 80.0% | 78.6% | 78.6% |

Annex17 Method and analysis of the agricultural river basin planning and management

1. Method – Overview of Distributed Water Circulation Model –

A distributed water circulation model was introduced as a fundamental tool to implement river basin management and development. Given daily meteorological data for every grid cell, the model calculates spatial distribution of surface runoff, evapotranspiration, river flow and water demand (Fig. 1). In addition, it represents human activities in river basins including operation of water use facilities (dams and weirs), and return flow from irrigated areas. Thus, the model is a useful tool not only for evaluation of current balance between water demand and resource, but also for prediction of the future changes in the water balance based on some scenarios such as operation of water use facilities, priority orders for water use, and irrigated areas. The results of the analysis is important to show them what will happen if we continue to manage water resources based on current operation rules, and to indicate what actions may be needed to prevent undesirable outcomes.

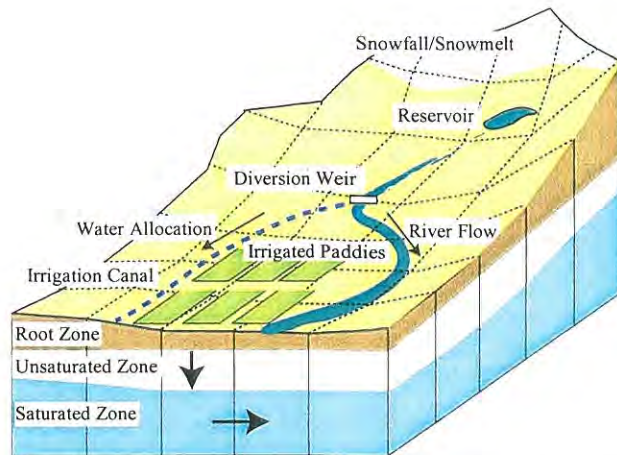


Fig.1 Structure of Distributed Water Circulation Model

The results of the analysis is important to show them what will happen if we continue to manage water resources based on current operation rules, and to indicate what actions may be needed to prevent undesirable outcomes.

2. Results in Case Study Basin

We performed a case study in the Pursat River Basin, where multiple projects, including dam construction and irrigation development, are ongoing (Fig.2). We attempted to predict future conditions of balance between water demand and resource including the effects of future dams.

We first calculated river discharge by using the model with observed rain data for the period from 2005 to 2011, and calibrated it with observed data

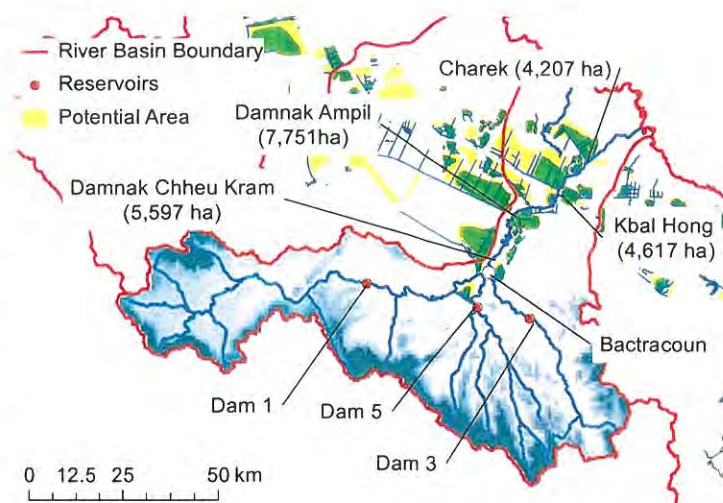


Fig.2 Overview of the case study watershed

(Fig.3).

Next, we performed a water balance analysis of the basin using the compiled model. Meteorological data required for water resources planning is 20-30 years generally to account for its long-term variation in water resources. However, in our case study basin, only 7 years of catchment-scale rainfall data was available. Instead of observed data, we prepared 25 years of data by using a climate model with a statistically corrected bias. To examine the results of the water balance calculations, we determined a reference year for irrigation planning from the long-term meteorological data such that annual precipitation would exceed the base amount 80% (Fig.4).

We then checked the water balance at each irrigated areas under no-dam conditions. We selected a scenario for irrigated areas from the Water Balance Study Report (JICA, 2013) to project the future water demand. We calculated variations in river discharge and the gross water requirement at every diversion weir. The results suggested that water supply was more than adequate to meet water demand in the reference year.

We finally incorporated the future dam operations into the calculations and evaluated the impact of the dams on river flow

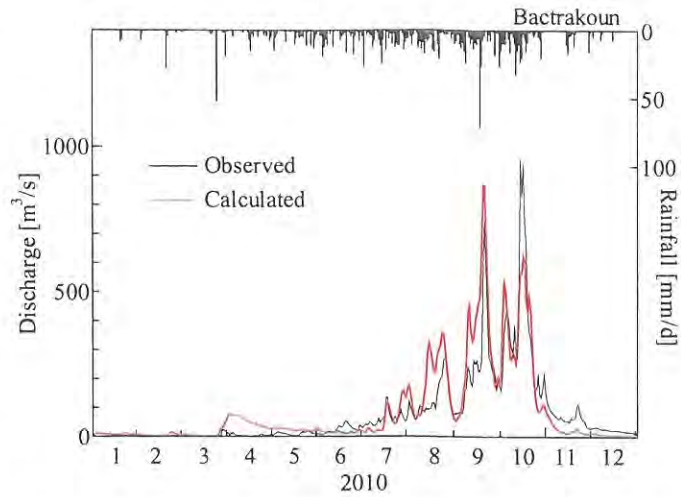


Fig.3 Comparison of observed and calculated discharges

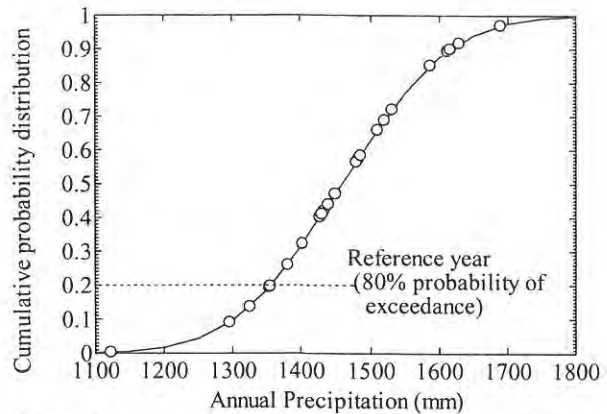


Fig.4 Selection of reference year for planning⁸⁾

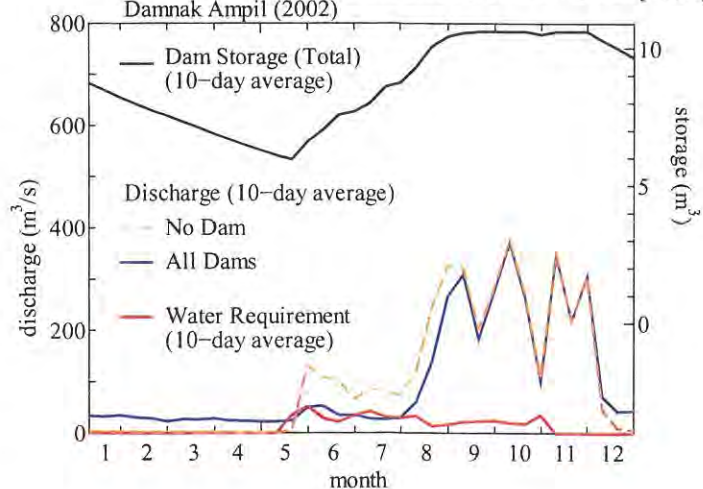


Fig.5 Water balance and dam storage in the driest year

and irrigation projects. Even under the changed flow regimes, the water balance at each irrigation area was satisfied in the reference year. However, river flows decreased during the period from June to August, whereas the river flows after dam construction increased notably in the dry season by 30 m³/s. This is mainly due to the operation of a hydropower dam (effective storage: 1,014 million m³, maximum discharge: 38.8 m³/s, Fig. 5).

These results indicated that further increases in the irrigated area or severer drought years would cause water deficits for the irrigated areas. We therefore need to establish measures to improve coordination among water users. Detailed measures will be established in the next Technical Corporation Project 'River Basin Water Resources Utilization'.

Training Program for Newly Recruited Staffs of MOWRAM (Draft)

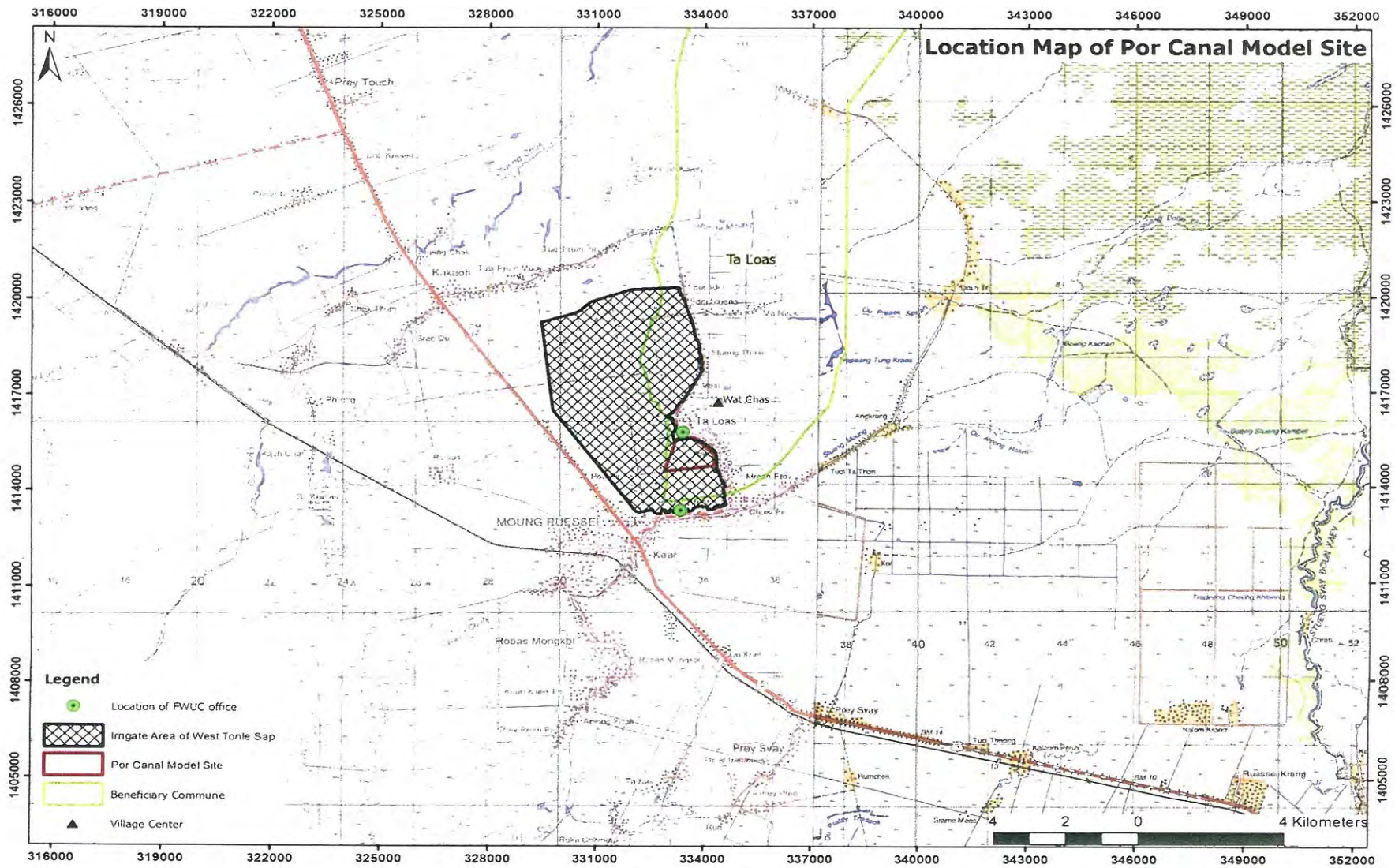
As of December 2012

| Training Target | | | | | |
|------------------------------|--|---|--|---|---|
| Experiences of the trainees: | | Engineers and Technicians of MOWRAM who were employed within approximately 5 years | | | |
| Affiliated divisions | | Technical directorates, even to the other directorates if trainee is capable to transfer to the technical directorates. | | | |
| Others | | Regardless of gender, but he/she are hopefully less than 30 years old. | | | |
| Training Curriculum | | | | | |
| Training Category | Subject Title | Contents | Responsible organization/trainer | Training period | Remarks |
| Technological Knowledge | A: Introductory Lessons for water resources management and IWRM | <ul style="list-style-type: none"> - Concept of IWRM - Water basin conservation - Participatory water resources management etc. | TSC (using existing training recourses) or WRMSDP (H.R.D.) | 1 week | TSC3 Training Course of R-2-1 (Basin-wide Irrigation Planning), R-3, R(Irrigation Water License) are referable. |
| | B: Introductory Lessons for irrigated agriculture | <ul style="list-style-type: none"> - General knowledge of agriculture and agri-business - Crop cultivation, and agriculture - Importance of irrigation for stabilizing and increasing crop production etc. | RUA (dispatching lecturer) | 1 week | If necessary, it should be contacted with Prof. Dr.Seng Mom (Vice Rector) |
| | C: Introductory Lessons for irrigation water use and irrigation system | <ul style="list-style-type: none"> - Irrigation water demand and irrigation water supply - Structure of irrigation system - Operation and maintenance of irrigation system - Irrigation management by FWUC etc. | TSC (using existing training recourses) | 2 week | TSC3 Training Courses of A-1, 2, 3, 4, B-2 are referable. |
| | D: Introductory Lessons for Meteorology and Hydrology | <ul style="list-style-type: none"> - General knowledge of meteorology and meteorological observation - General and global water cycle, hydrological observation and data arrangement - Type of water resources, conservation and development of water resources etc. | TSC (using existing training recourses) or WRMSDP (H.R.D.) | 1 week | TSC3 Training Courses of B-2, R-1-a, R-2-2 (Discharge measurement) are referable. |
| | E-1 | Beginners' lecture introducing the procedures of FS(Feasibility Study) on irrigation development | <ul style="list-style-type: none"> - Feasibility Study for irrigation development project - Project formulation and implementation - Project evaluation | TSC3 Project (In case, Japanese expert could be supported) | 1 week |

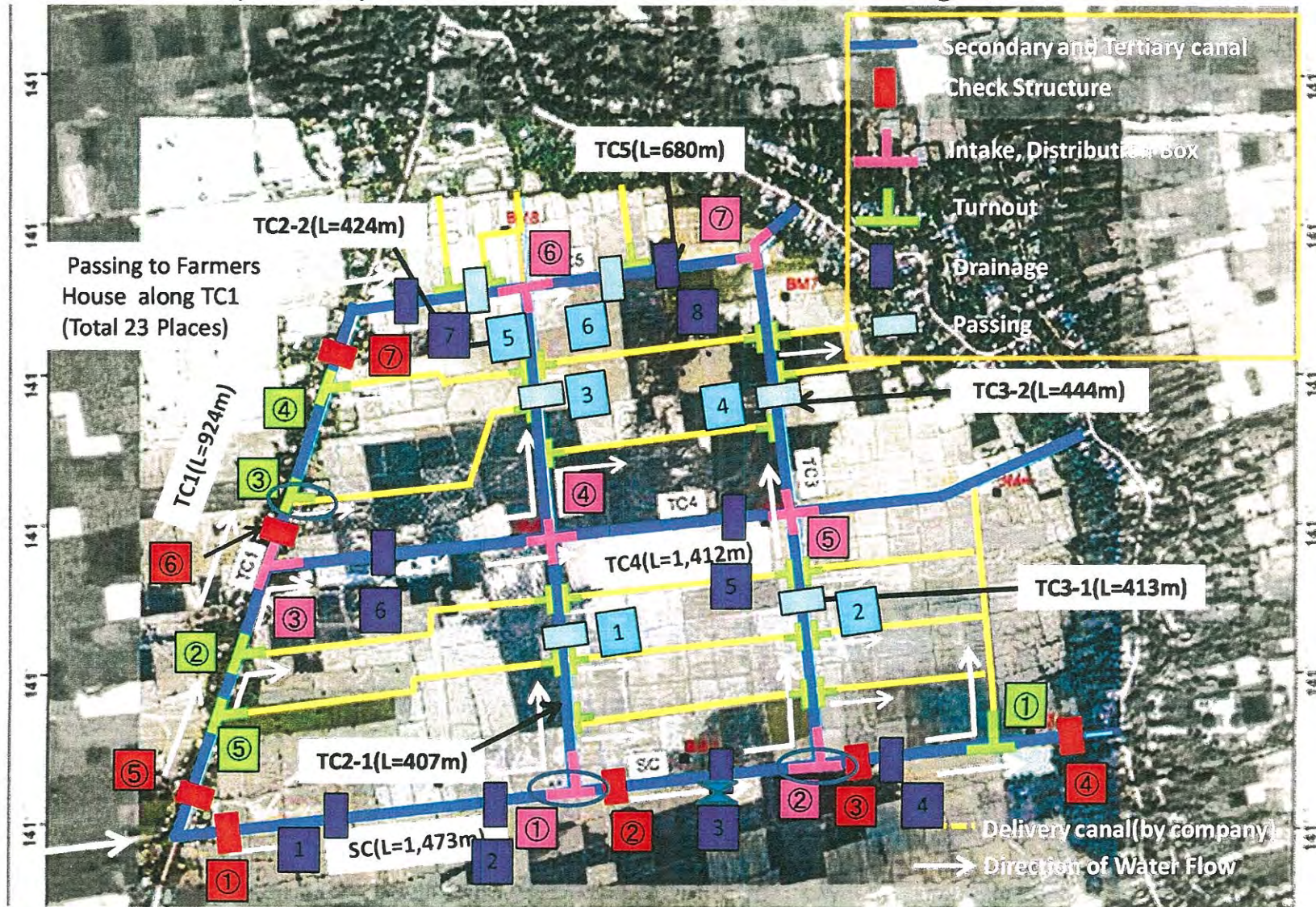
ANNEX 18

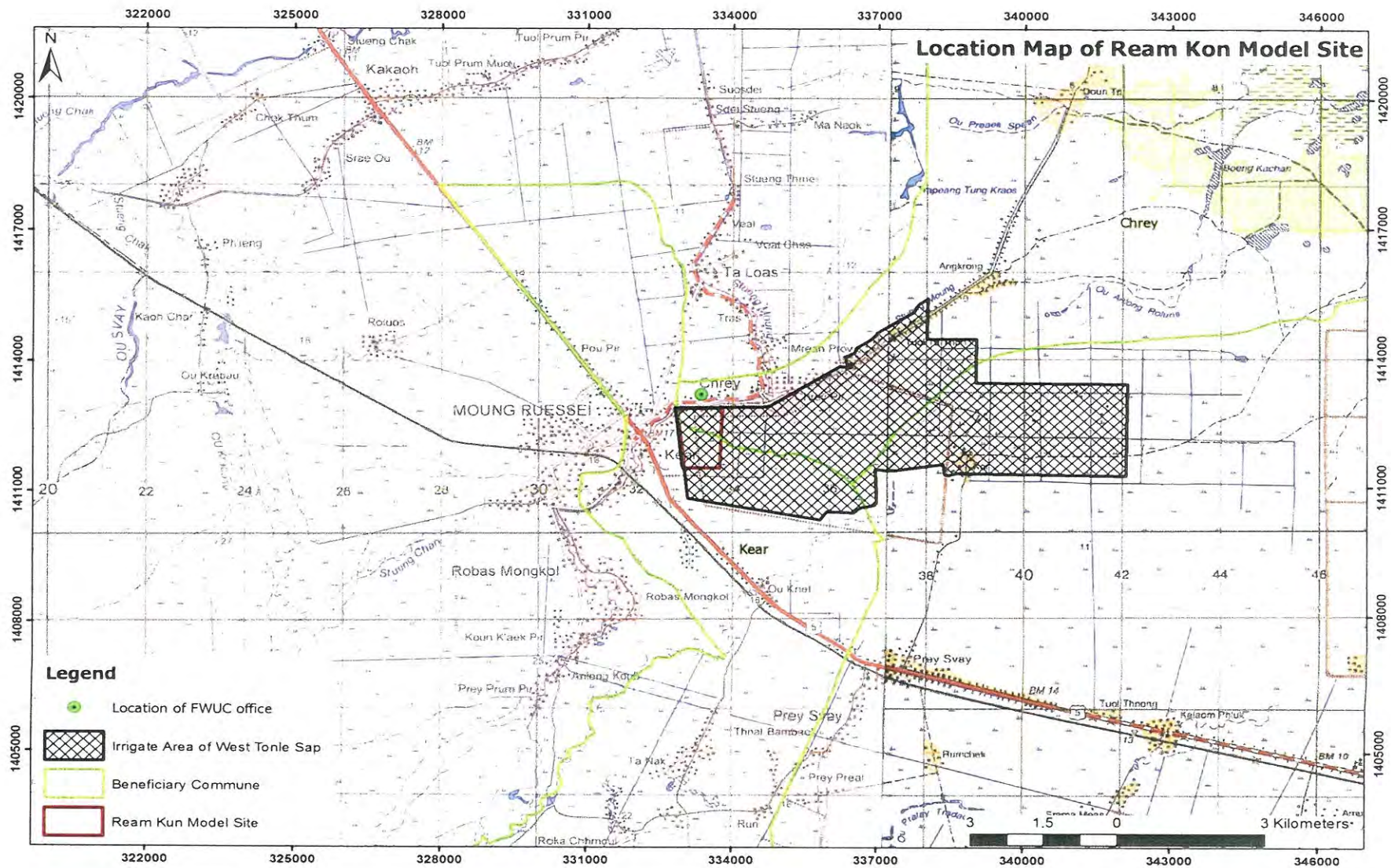
| | | | | | | |
|--|--|--|---|---|--|--|
| | | project | | | | |
| | E-2 | Beginners' lecture and exercise for learning project cycle management by means of holding PCM workshop | <ul style="list-style-type: none"> - Identification of Problems - Participatory project formulation - Learning PCM method - Participation in PCM workshop | | | Opened materials are available e.g. "Project Cycle Management" http://ja.scribd.com |
| Lessons for basic knowledge and skills | F-1 | Applying Mathematics | - Ability of calculation and analysis concerning to irrigation planning and designing | ITC (dispatching lecturer) | 2 weeks (depend upon the original abilities of freshmen) | If necessary, it should be contacted with Mr.PHOL Norith (Deputy Director of D.of Planning and Development) |
| | | Applying Physics | - Ability of understanding in physics concerning to irrigation planning and designing | | | |
| | | Applying science and technology | - Hydraulics, structural analysis, soil mechanics, etc. | | | |
| | F-2 | English | - Writing and speaking | Directorate of A&HR (Education course for Freshmen) | - | If additional training is need, 2-3 weeks training will be provided. |
| | | IT Technology | - Word, Excel, Auto CAD etc. | | | |
| F-3 | Topo-survey | - Basic plain survey, route survey etc. | TSC (using existing training recourse) | 1 week | TSC3 Training Courses of B-1 is referable. | |
| Lessons for good behaviors and disciplines | G | Disciplines in field work and behavior to beneficiaries | - Regulations and missions of MOWRAM | Directorate of A&HR (Education course for Freshmen) | Up to the schedule of current program. | Current "Orientating training/education managed by the Directorate of A&HR" is adoptable as it is. |
| | | Regulations and missions | - Equal attitude to beneficiaries and fair attitude to stakeholders | | | |
| | | Administrative affairs | - Common sense as public officer | | | |
| Training Goal | | | | | | |
| | Targeting Goal | | To be able to participate in the practical jobs done by the experienced engineers | | | |
| | Method of evaluation | | Post –evaluation test will be given | | | |
| | Follow-up measures | | Result of Post-evaluation test and remarkable notice for the trainees shall be put into a "database for personnel careers". | | | |
| Additional Description | | | | | | |
| | Finally, certification will be issued for the trainees who presented to the lectures of more than 90 %, and scored 60% of the evaluation test. | | | | | |

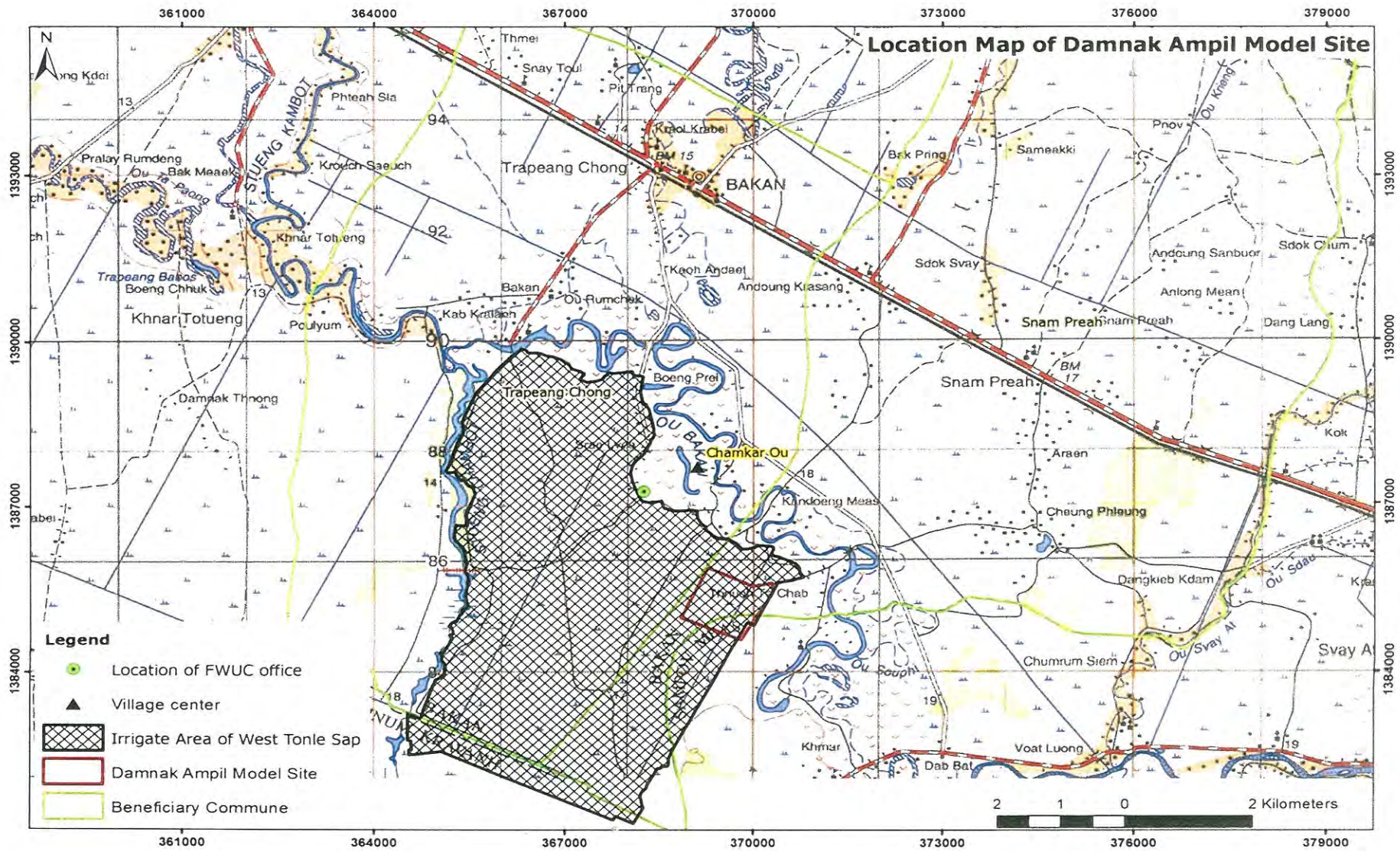
ANNEX19 : Layout Map of Canal Construction & Rehabilitation in Model Site



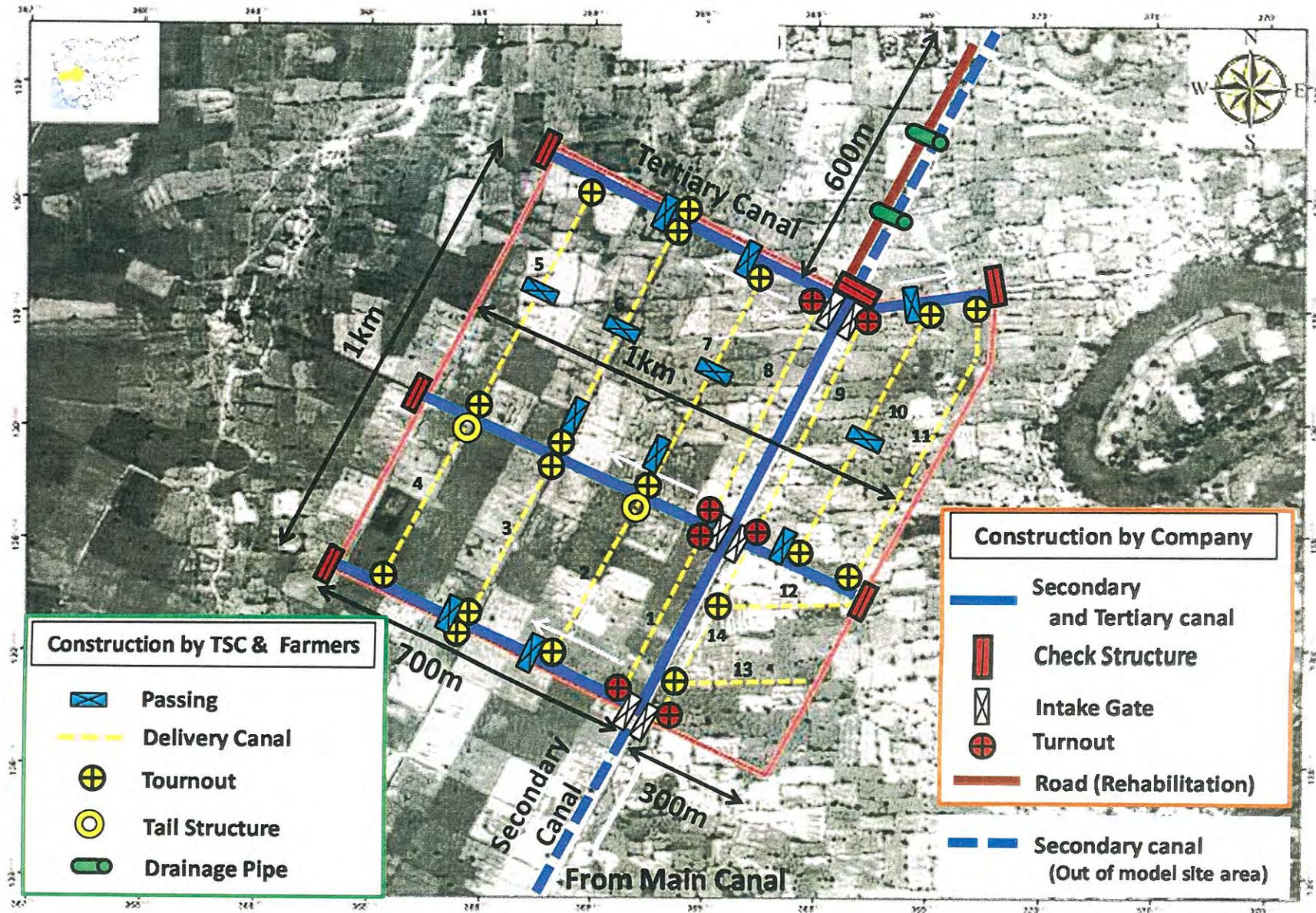
Layout Map of Por Canal Model Site in Battambang (All Area)

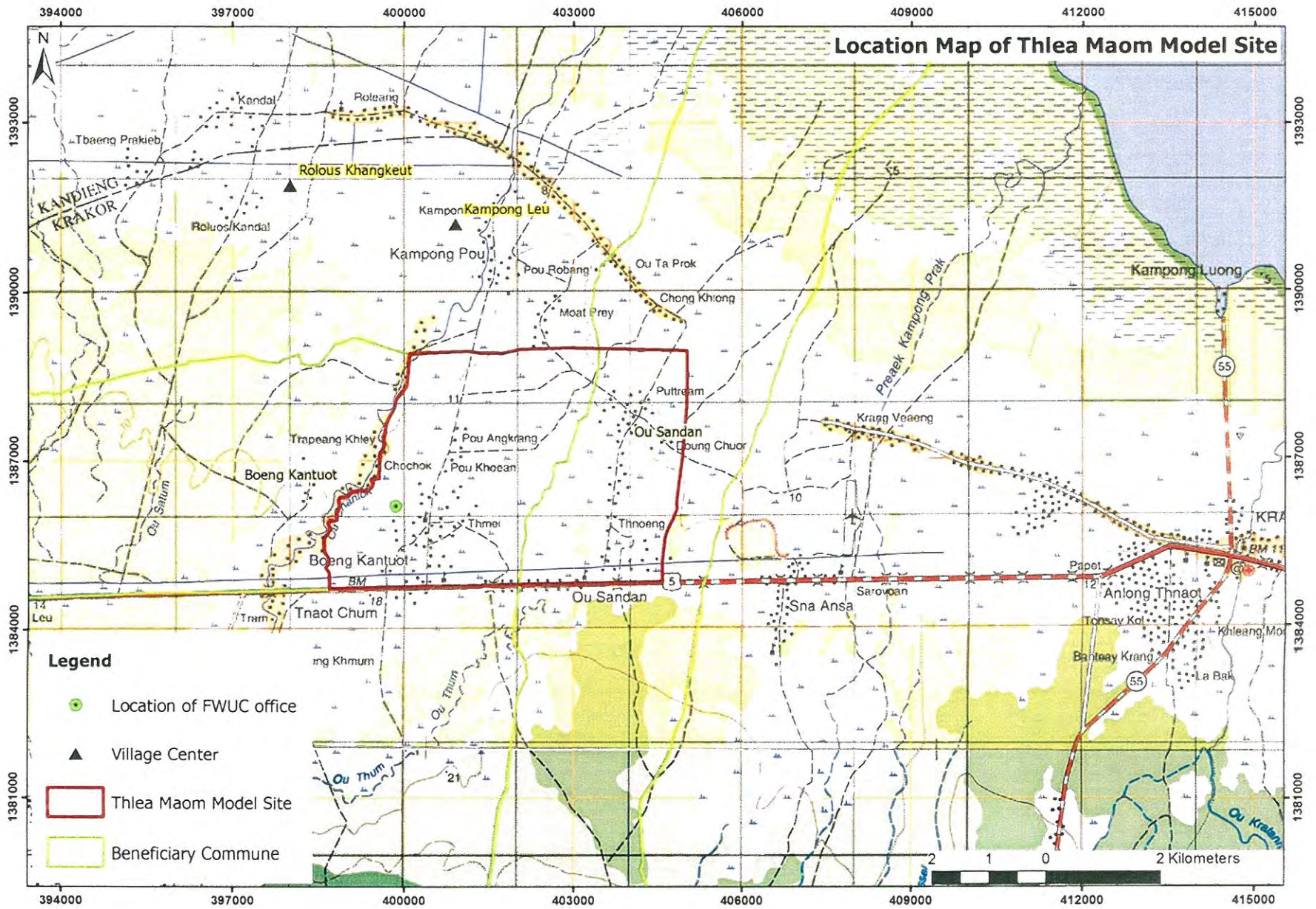






Layout Map of Damnak Ampil Model Site in Pursat

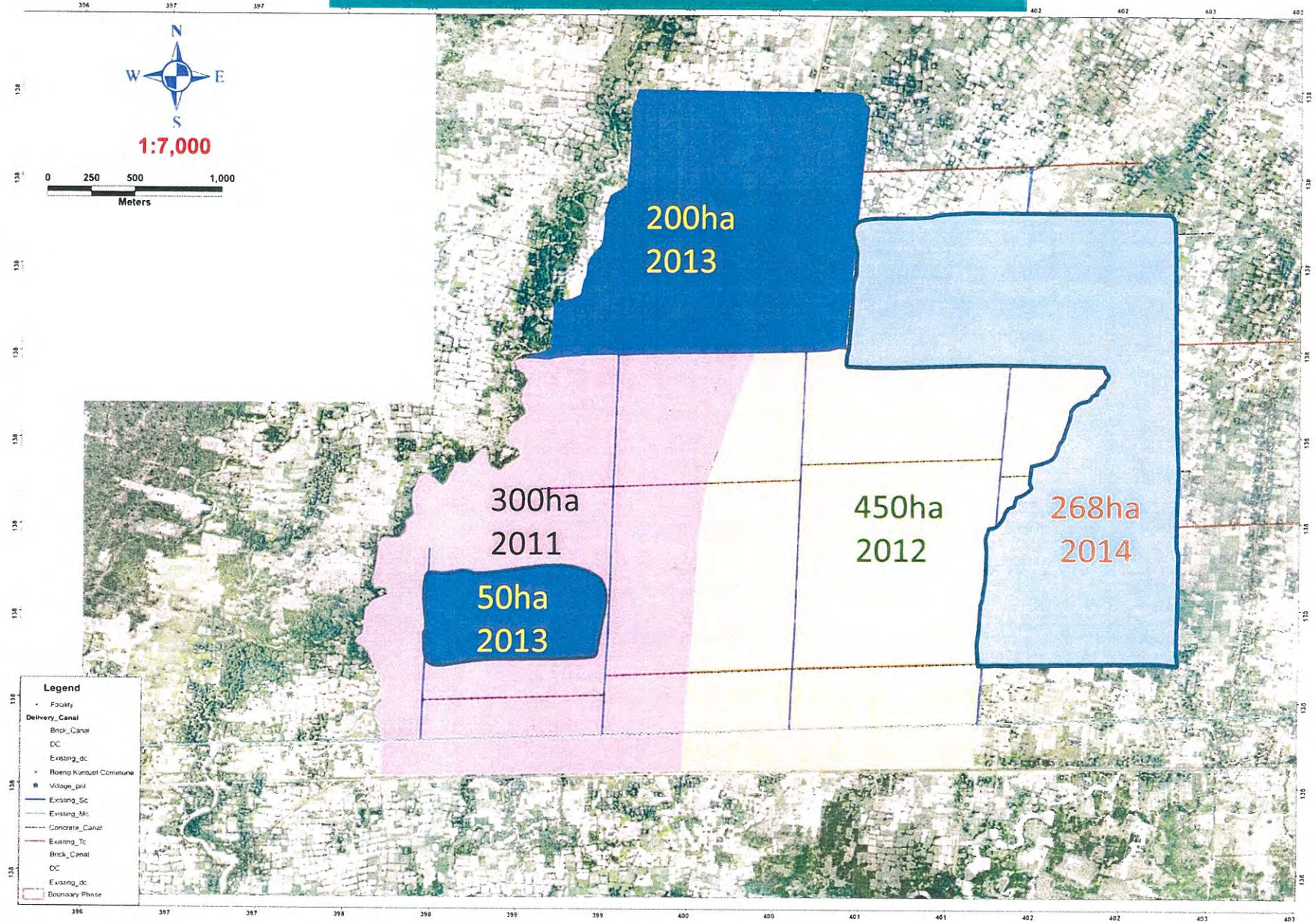




Layout Map of Thlear Maom Irrigation System



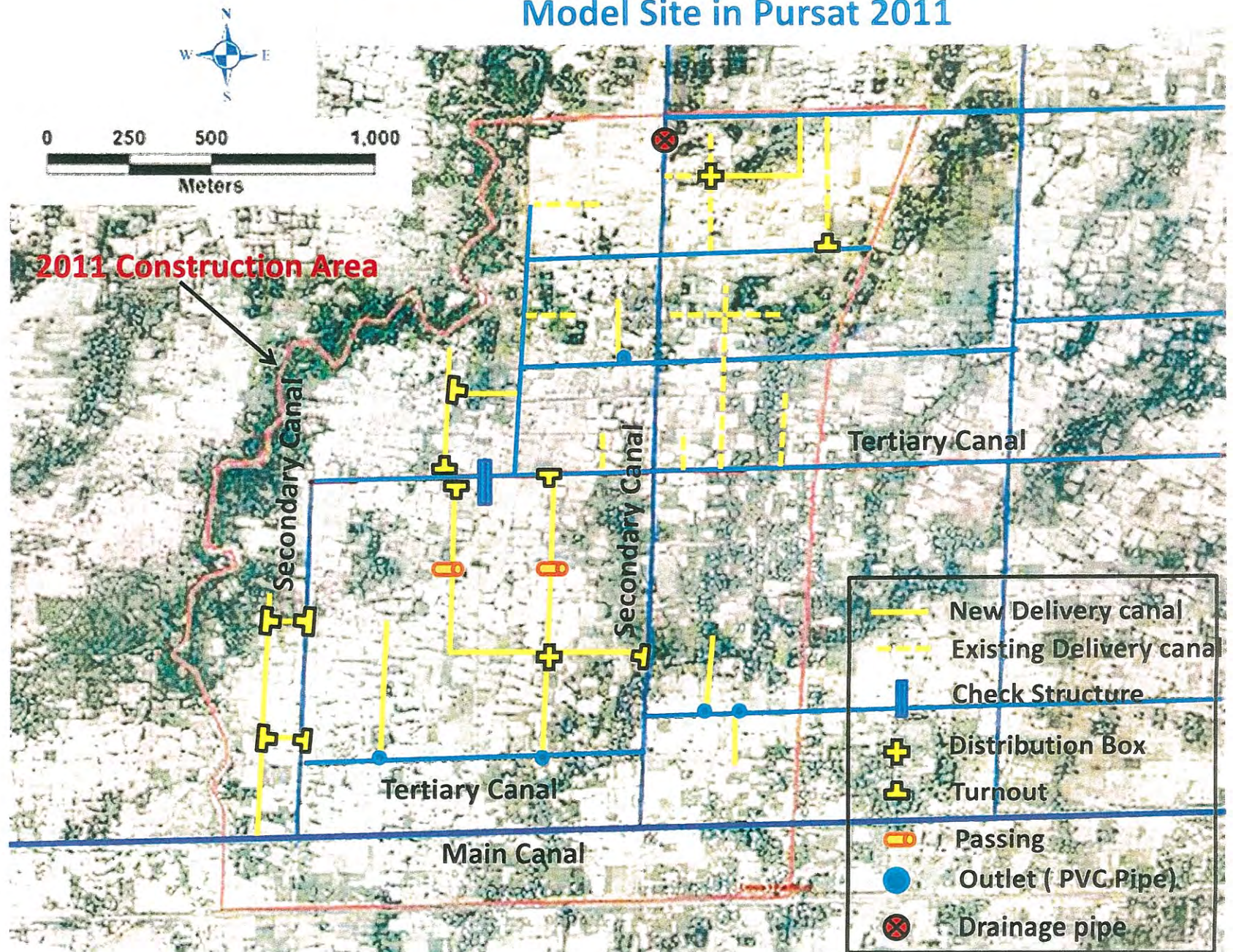
1:7,000



Legend

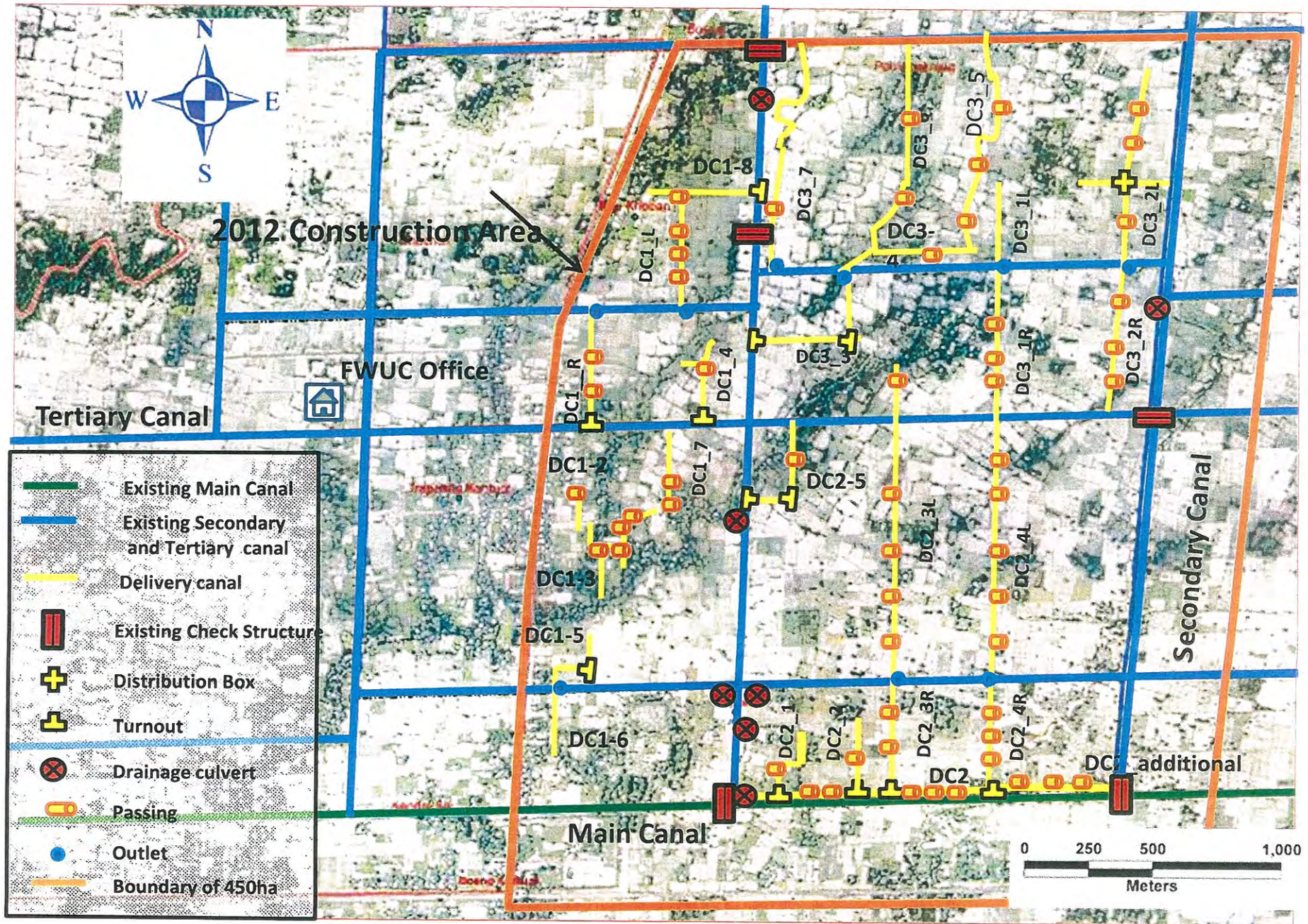
- Faculty
- Delivery Canal
 - Brick_Canal
 - DC
 - Existing_dc
- Boeang Kamboj Commune
- Village
- Existing_Sc
- Existing_Mc
- Concrete Canal
- Existing_Tc
- Brick Canal
- DC
- Existing_dc
- Boundary Phase

Construction Design Map at Thlea Maorm Model Site in Pursat 2011



- New Delivery canal
- Existing Delivery canal
- Check Structure
- Distribution Box
- Turnout
- Passing
- Outlet (PVC.Pipe)
- Drainage pipe

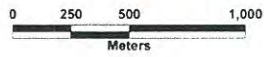
Layout Map of Thlear Maom Model Site in 2012



Layout Map of Thlear Maom Irrigation System 2013



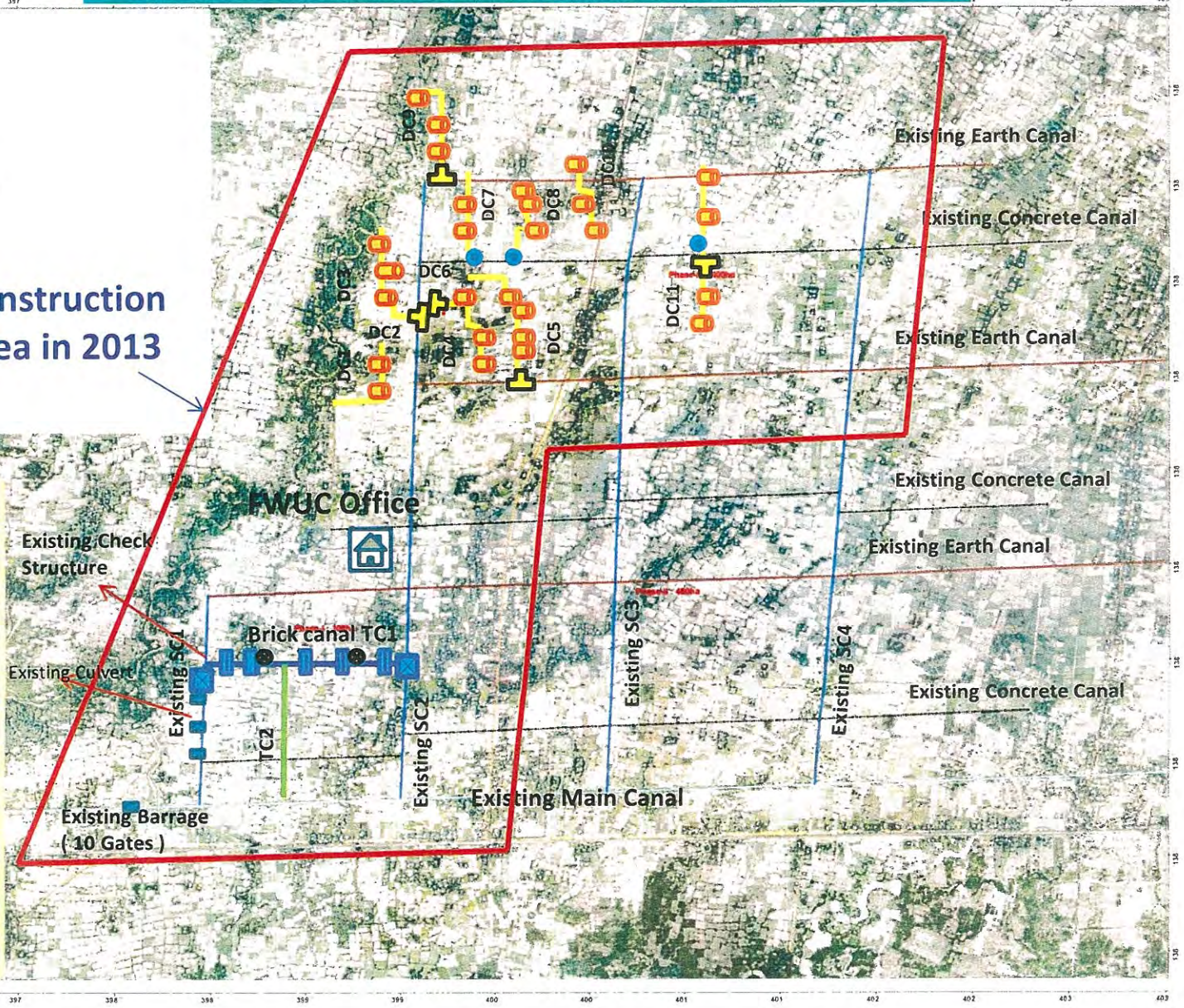
1:7,000



Construction Area in 2013

Legend :

- Brick Canal
- Tertiary canal
- Delivery Canal
- Passing
- Intake (TC1)
- Check gate
- Turn out
- Drainage pipe
- Outlet
- Area of 2013 construction



47 57

Layout Map of thlear maom Irrigation System



1:7.500



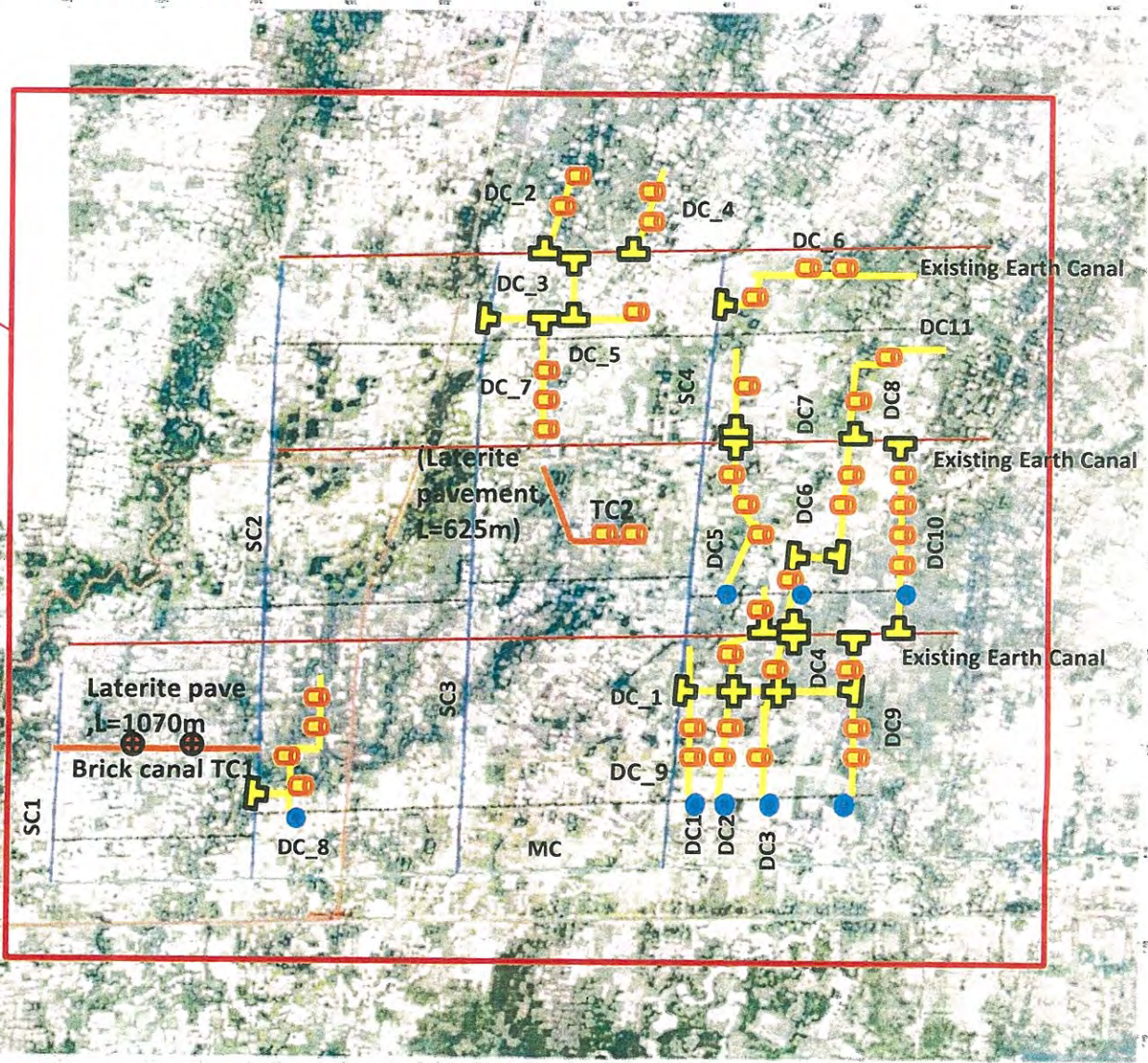
Construction 2014

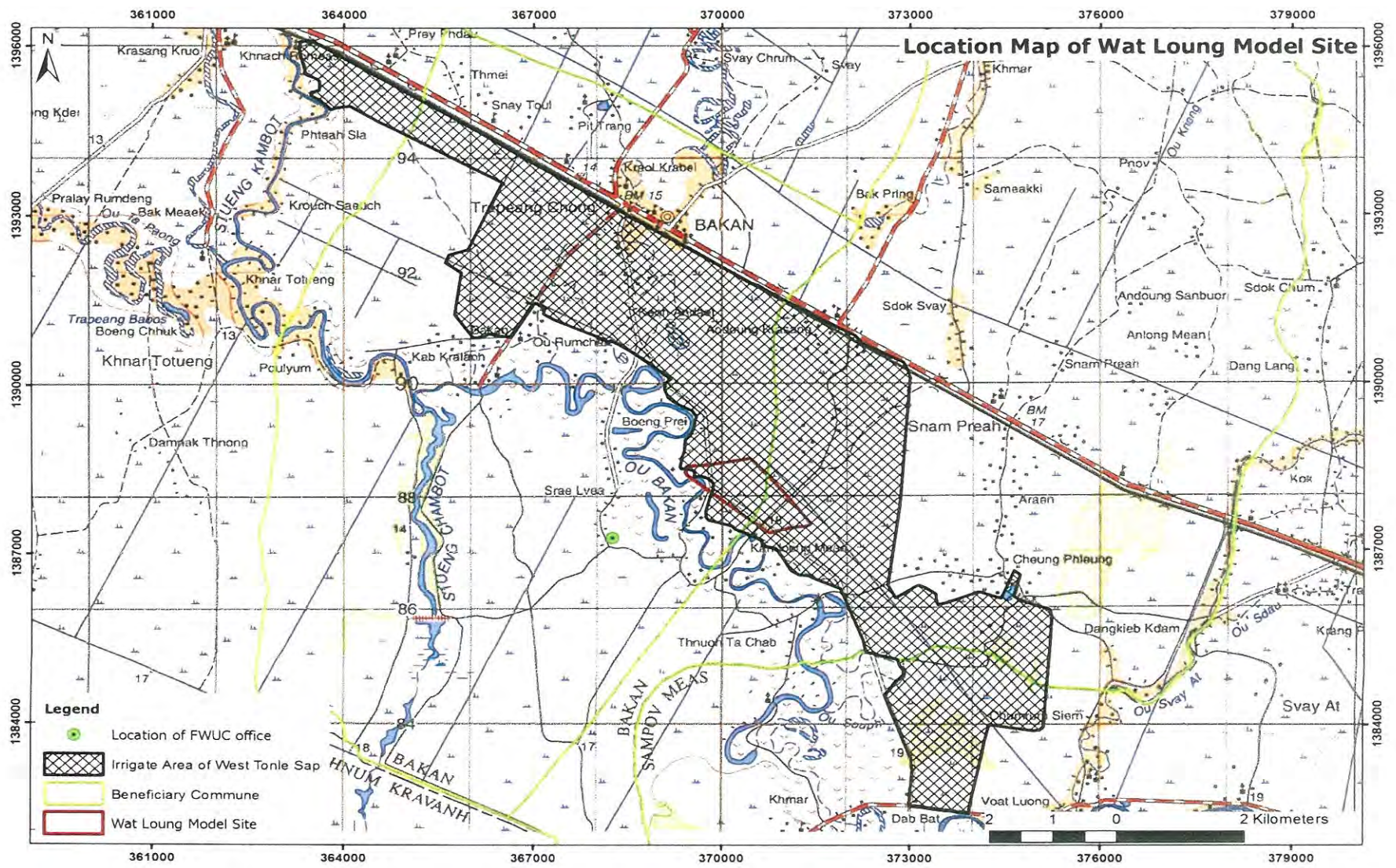
Legend

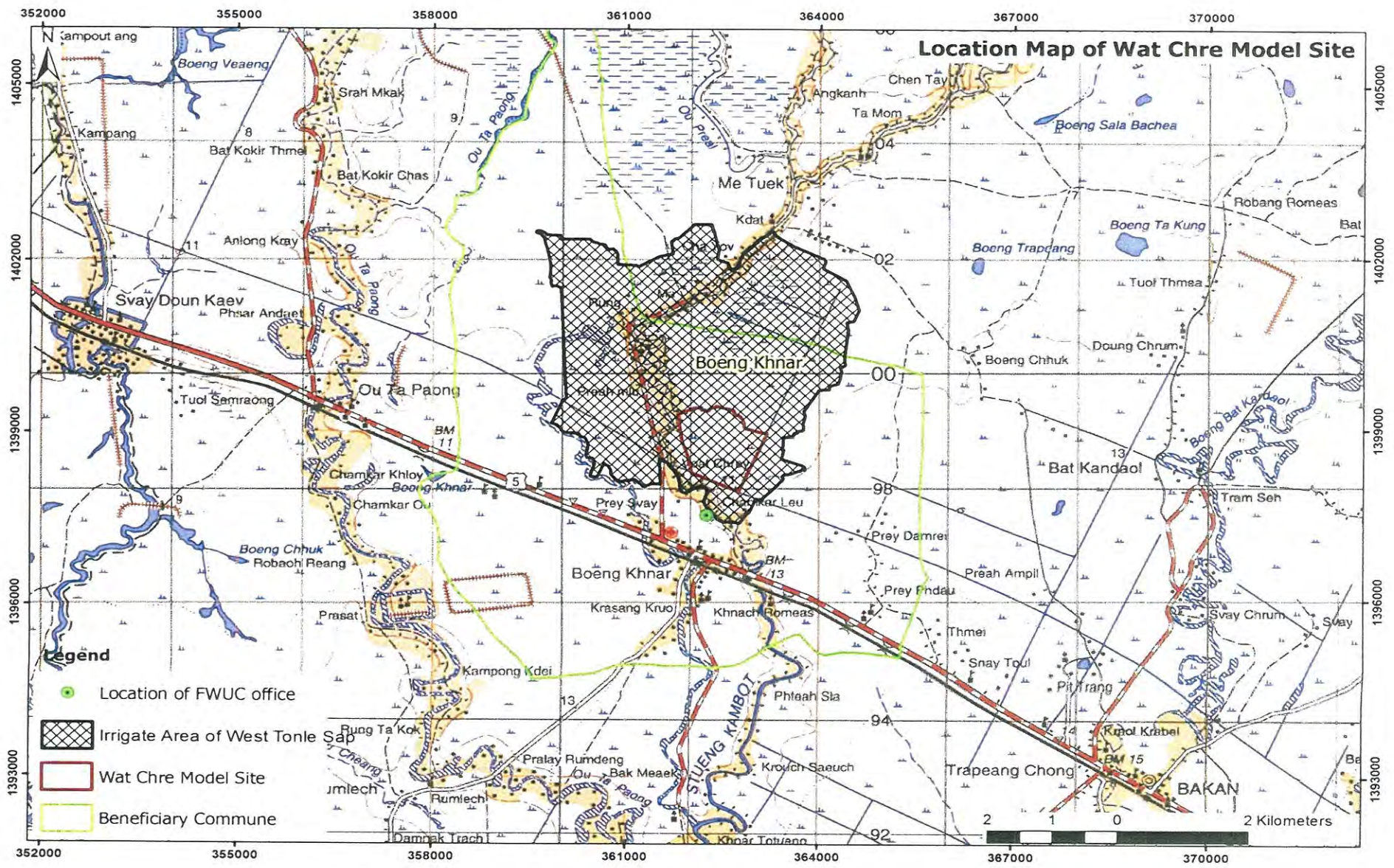
- Delivery canal
- Existing Earth Canal
- Laterite pavement
- Passing
- Turn out
- Drainage pipe Install
- Outlet
- Distribution box
- Area constru,2014

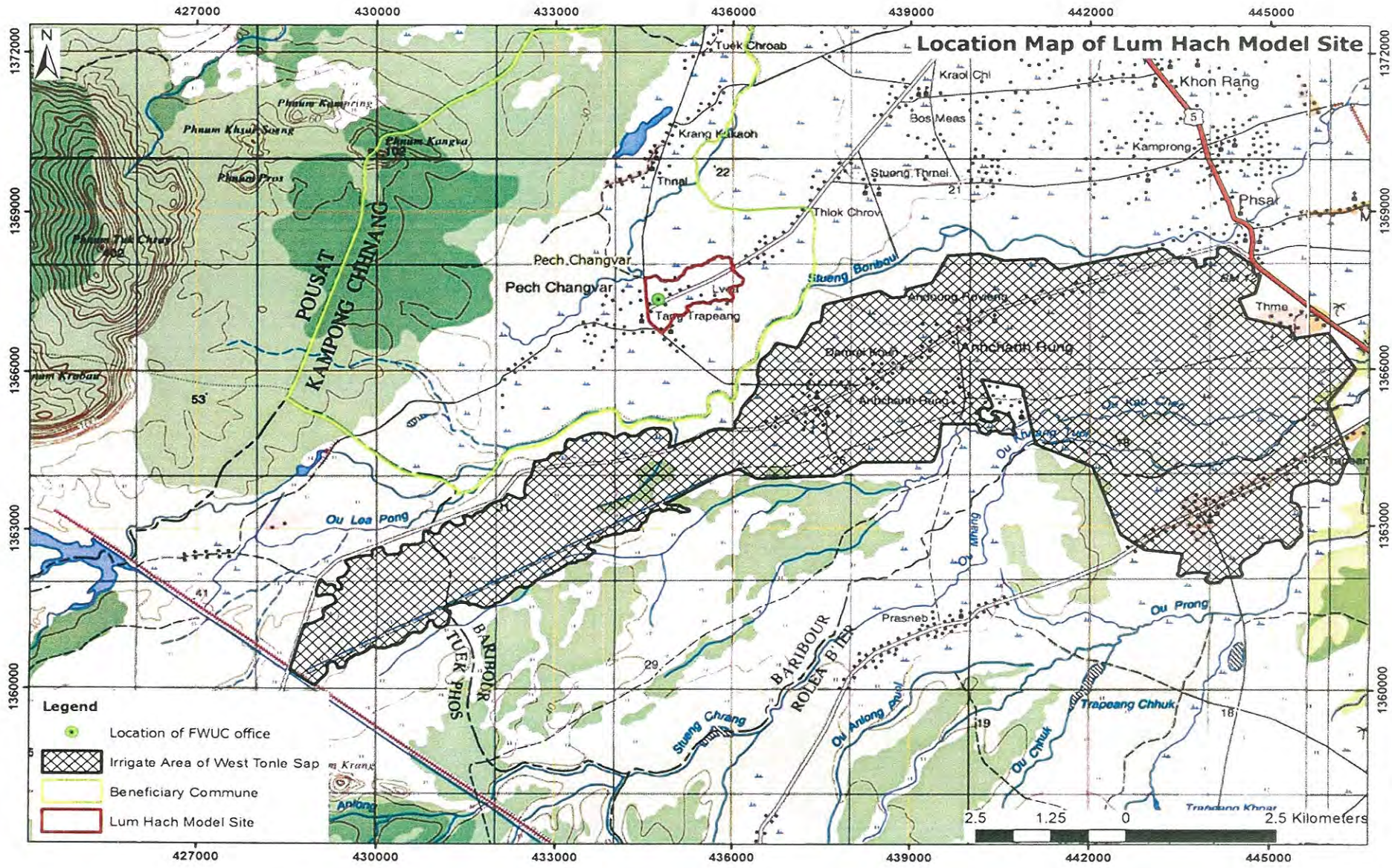
Legend :

- Delivery canal
- Existing Earth Canal
- Laterite pavement
- Passing
- Turn out
- Drainage pipe Install
- Outlet
- Distribution box
- Area constru,2014





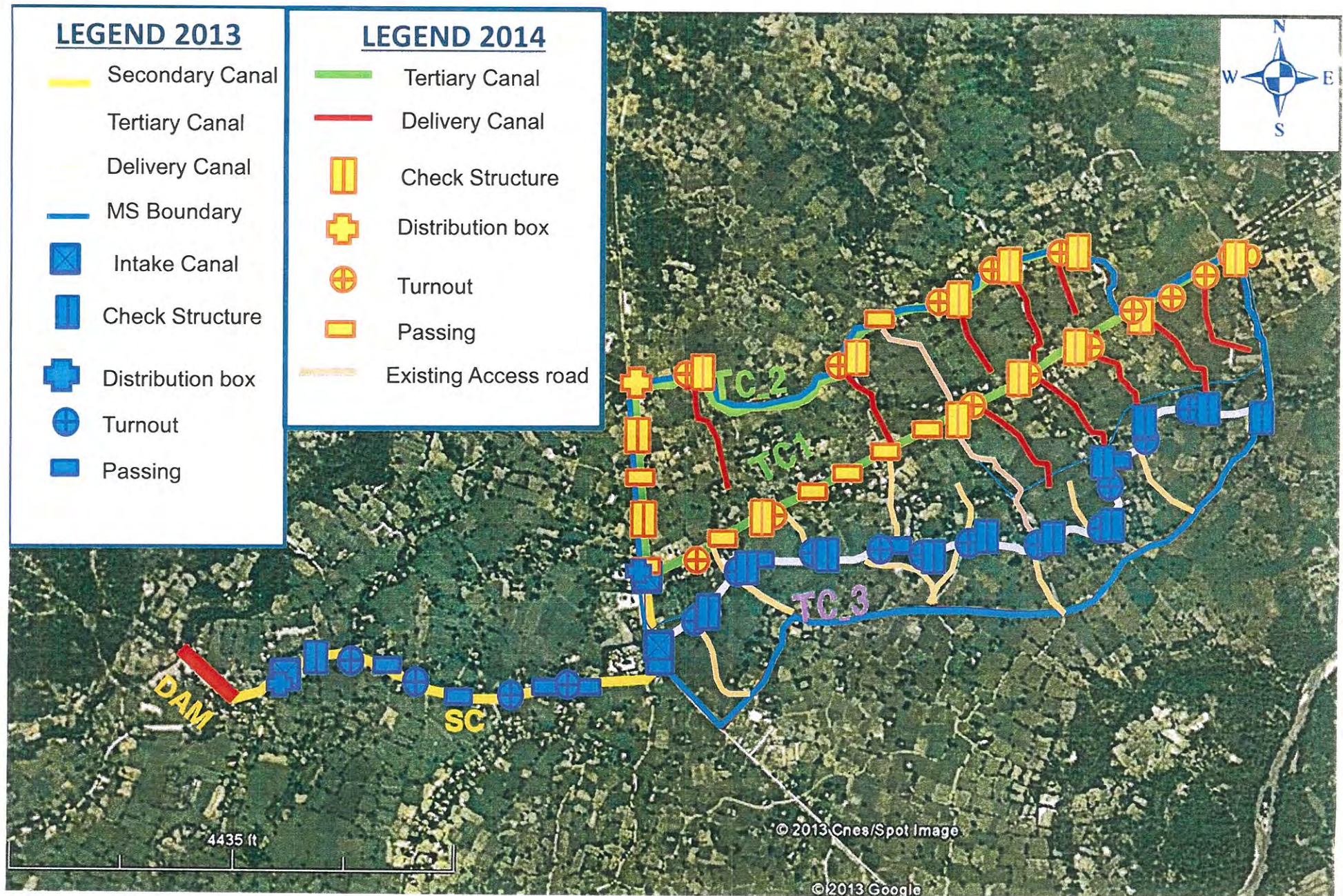


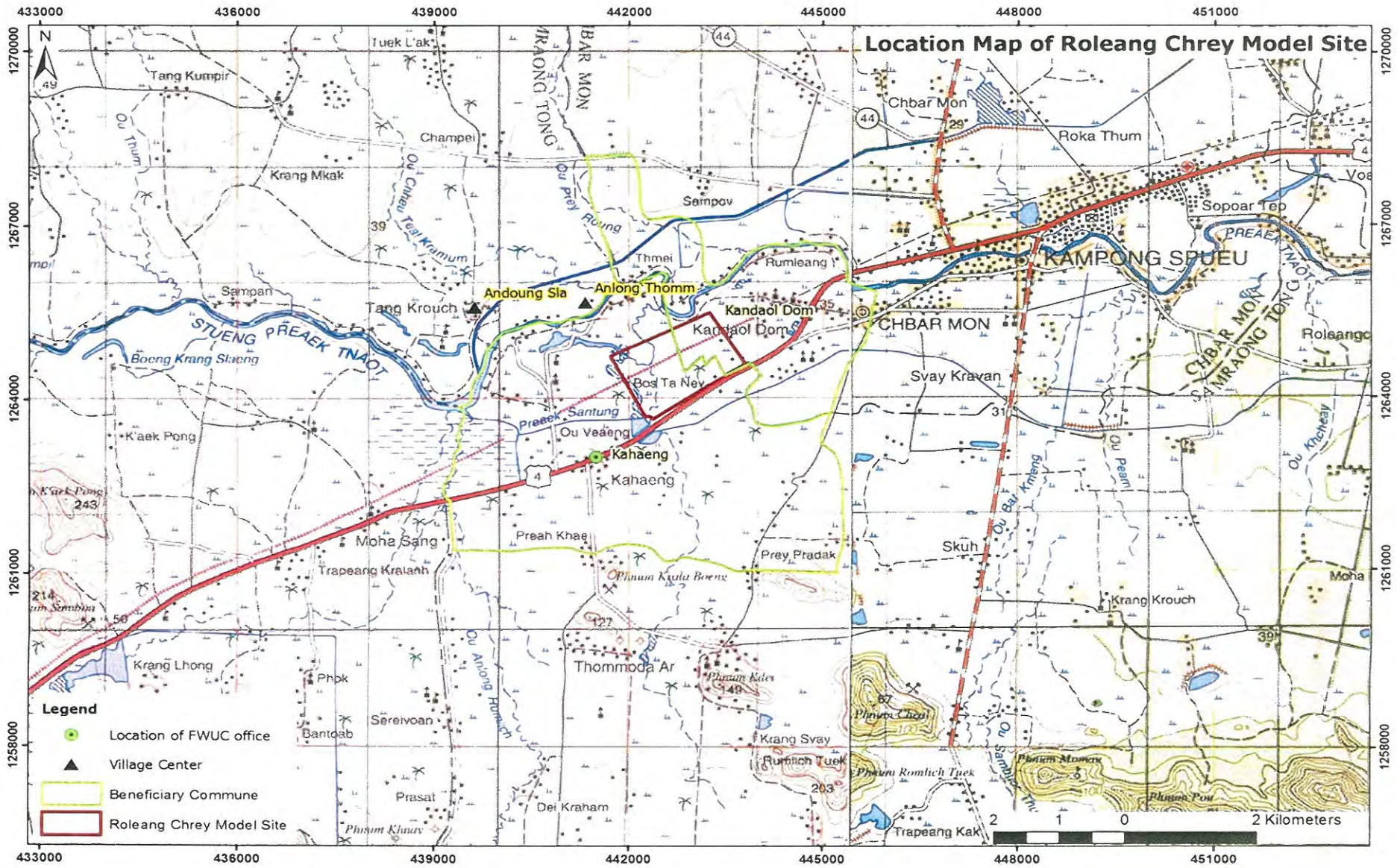


47

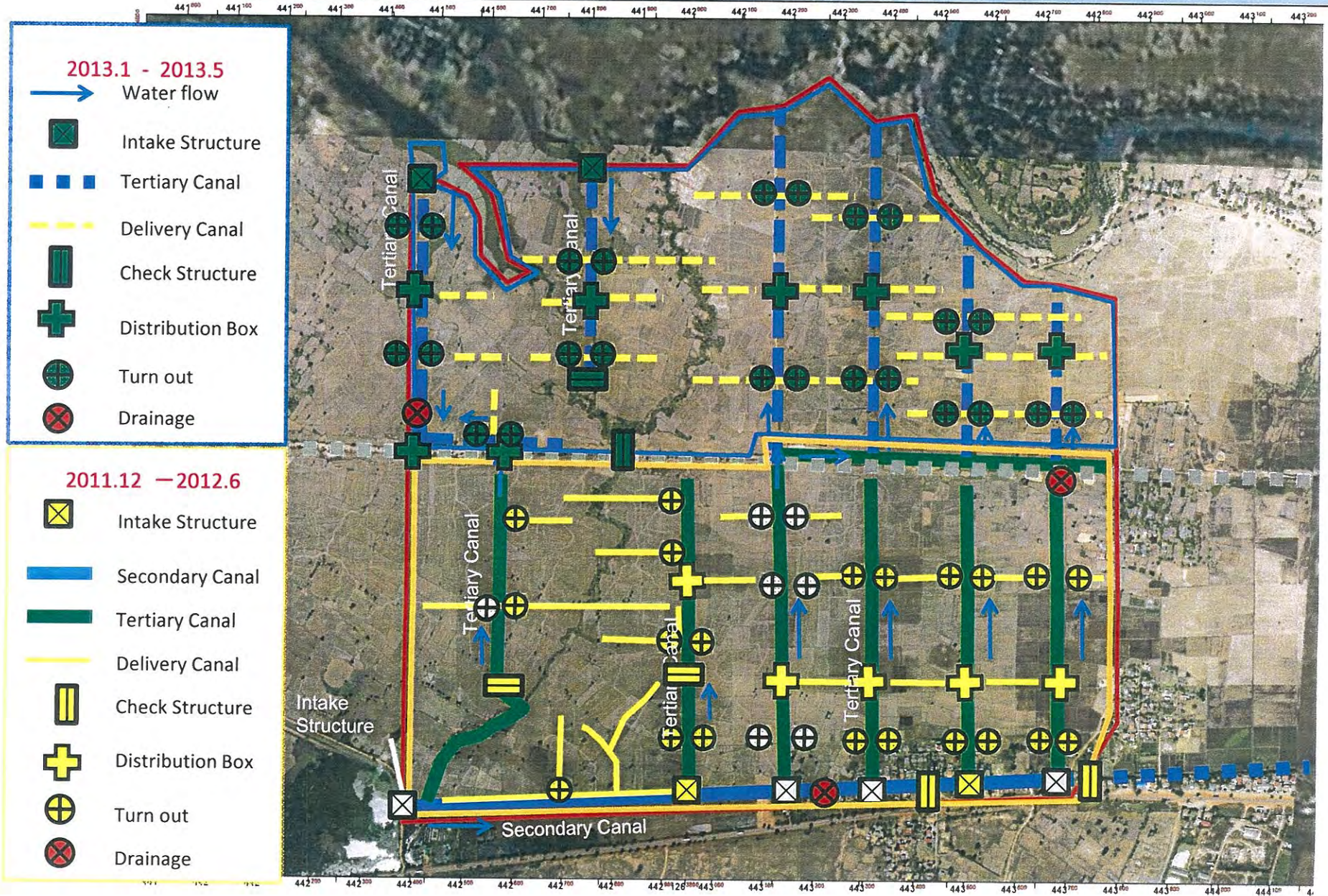
17

Layout Map of Lum Hach Model Site

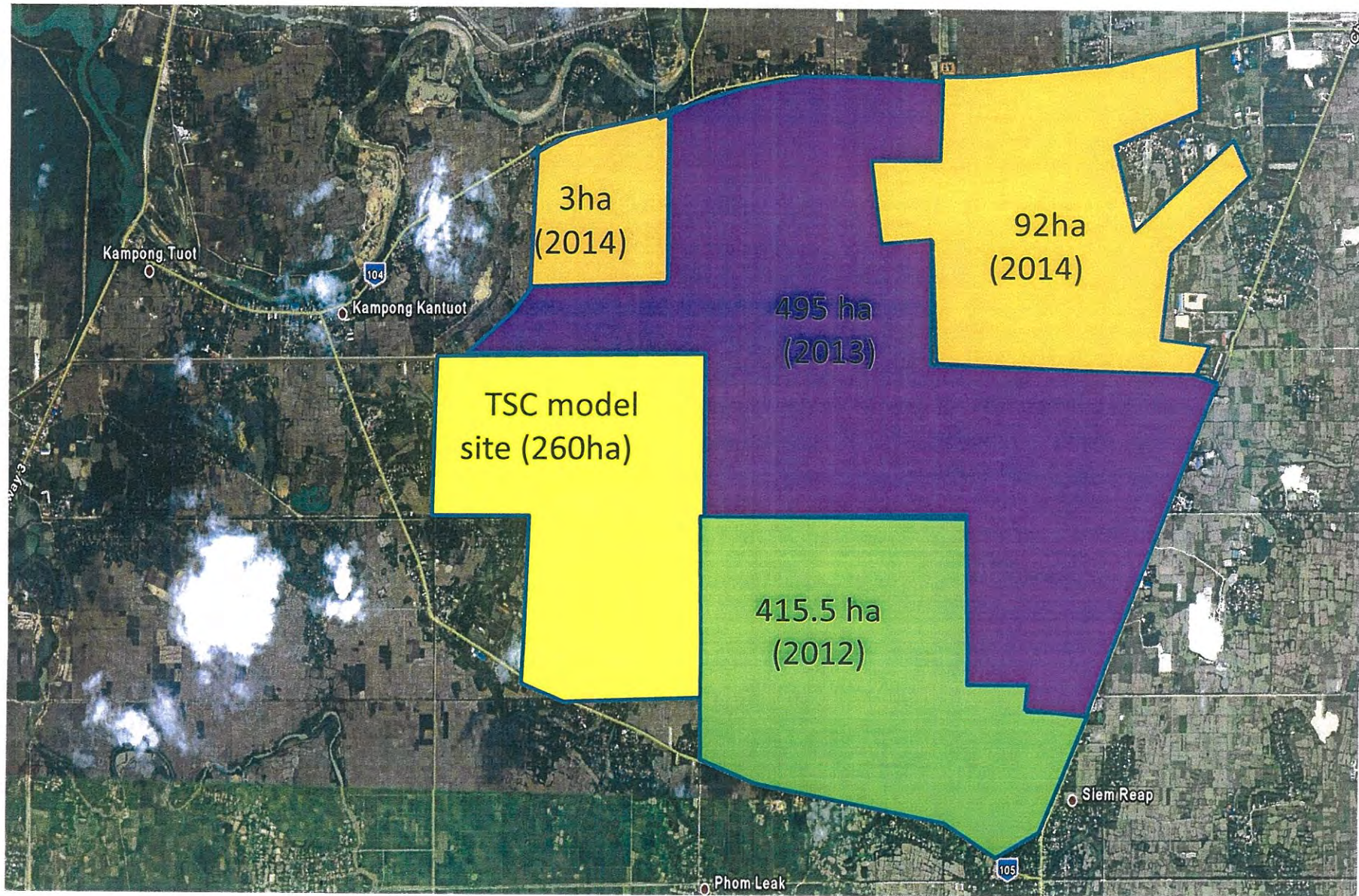




Layout Map of Roleang Chrey







Layout Map of Kandal Stung Irrigation System





Lay out Map of Kandal Stung Model Site

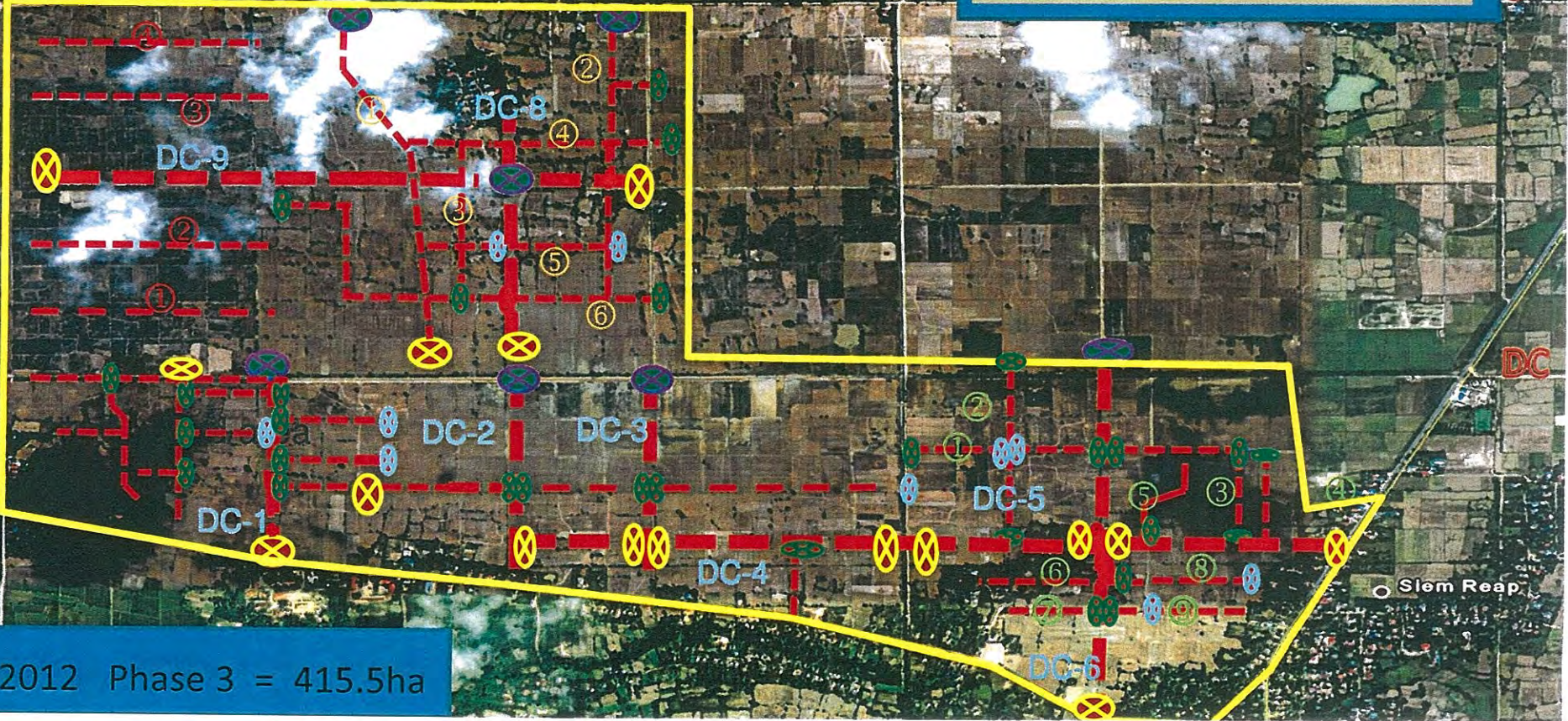
SC TC TC SC TC TC TC SC

18,04,12 – 12,07,12

- Intake 
- Passing 
- Check structure 
- Turn out 

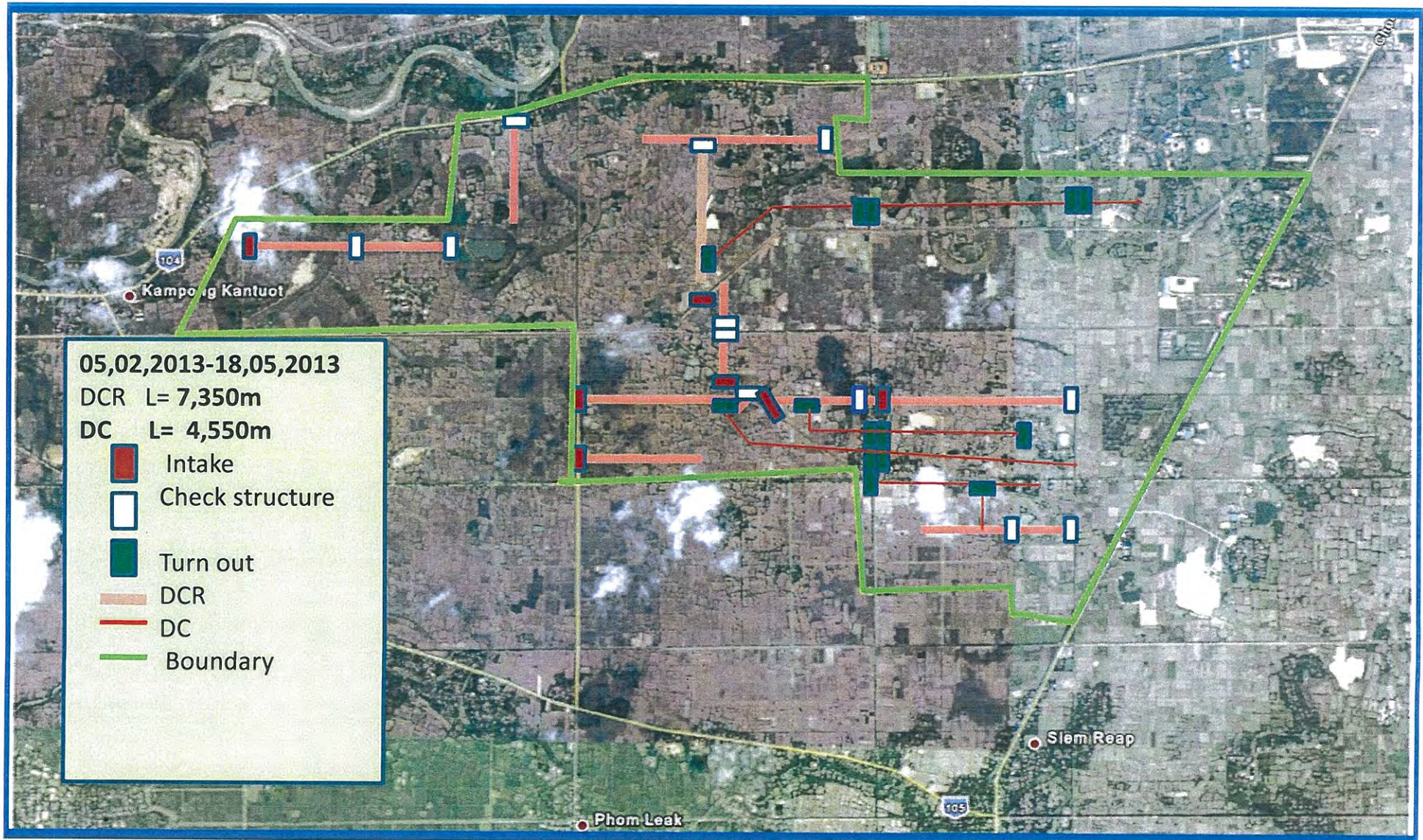
DRC 

DC 

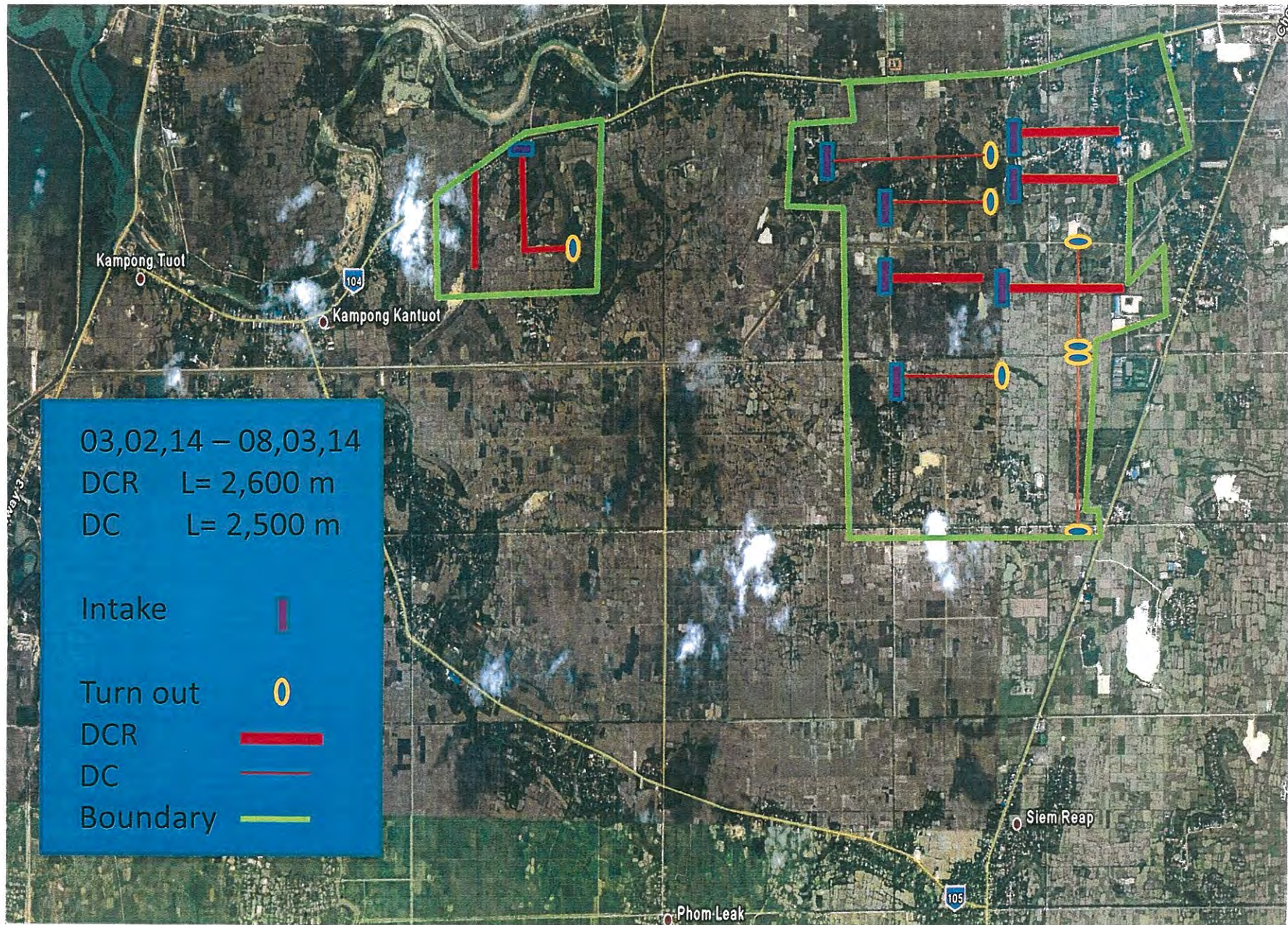


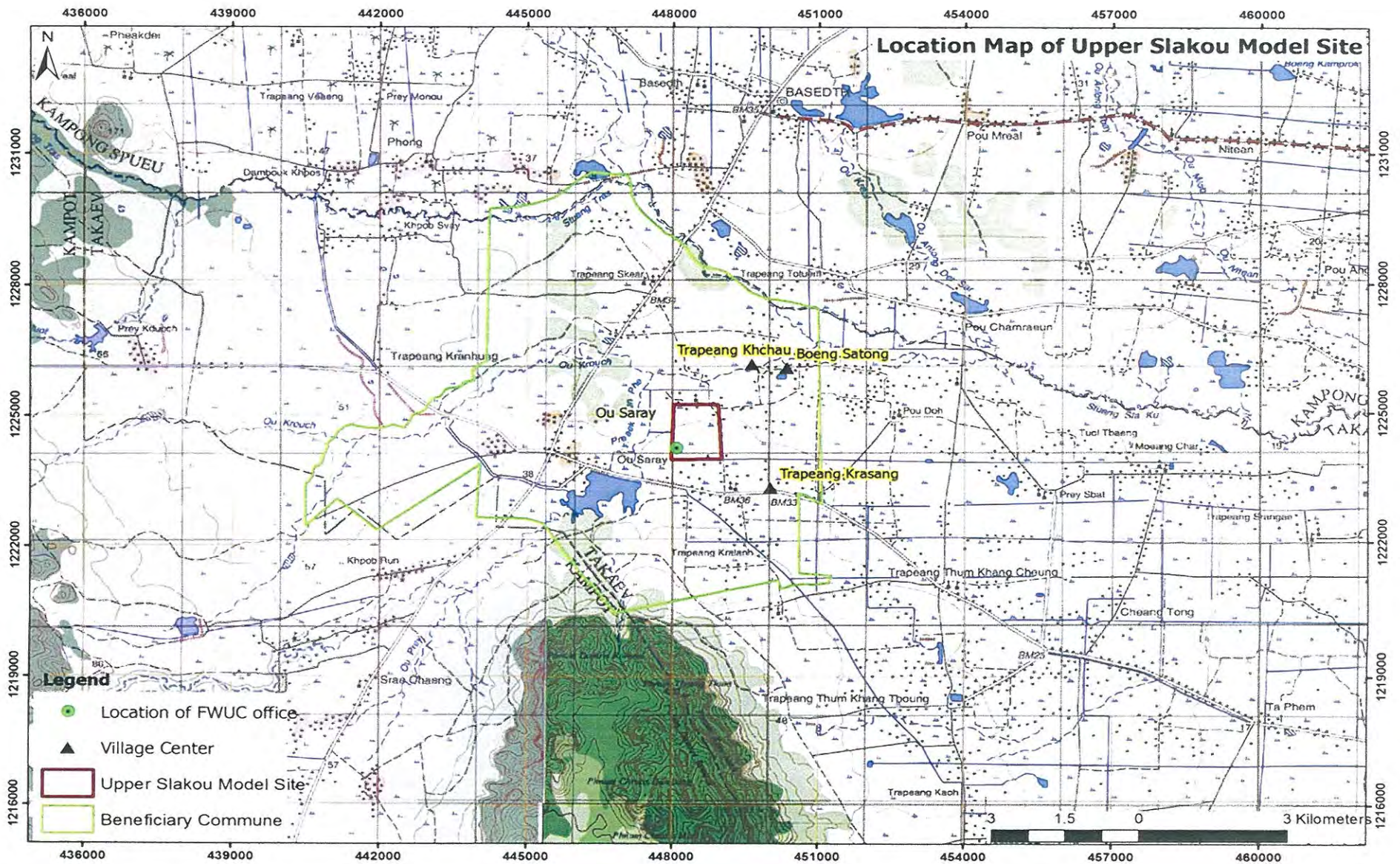
2012 Phase 3 = 415.5ha

2. Kandal Stung Model Site 2013 (Kandal Province)













Lay out Map of Kanadal Stung Model site in Kandal province in 2014














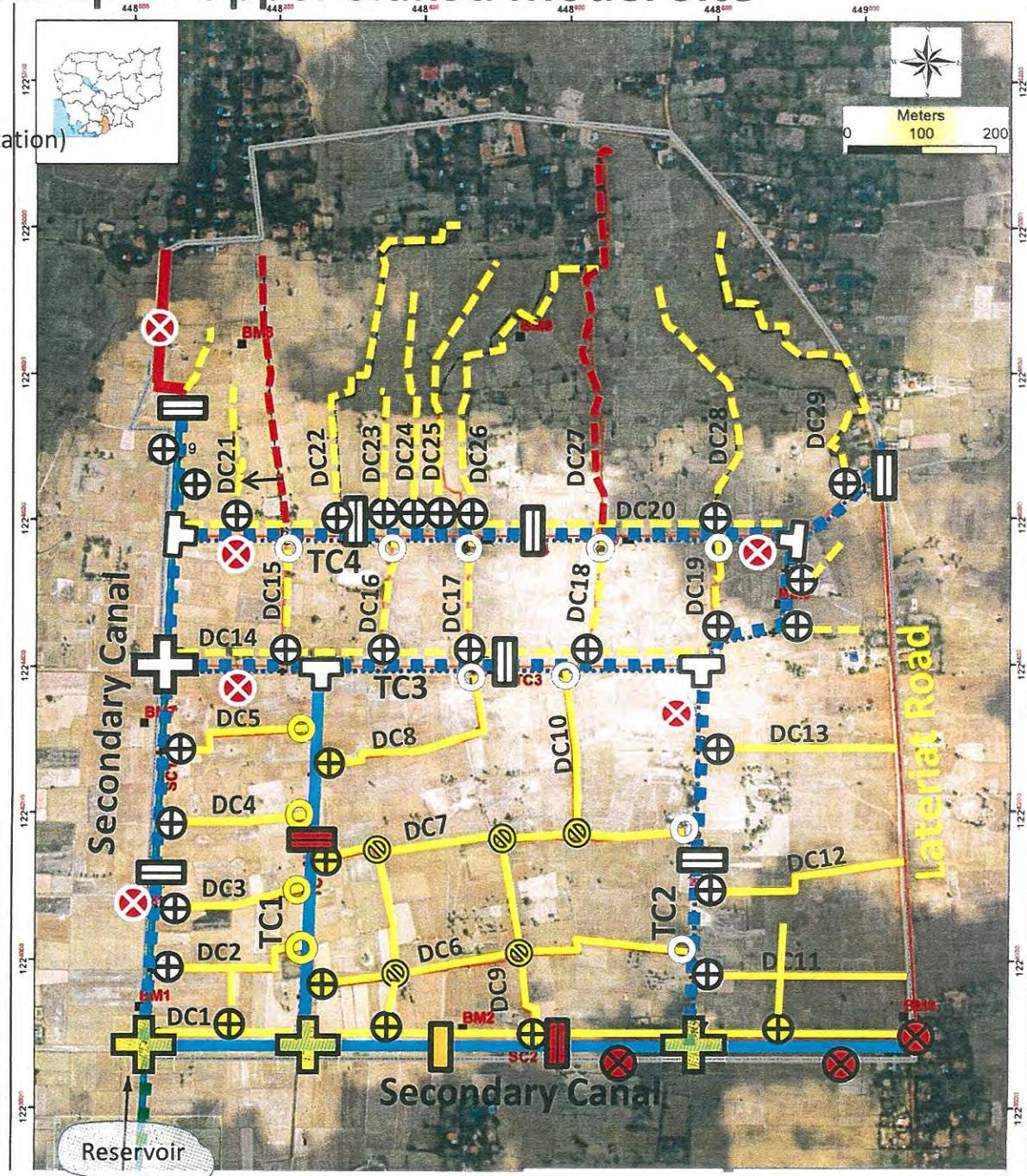
2. Layout Map of Upper Slakou Model Site

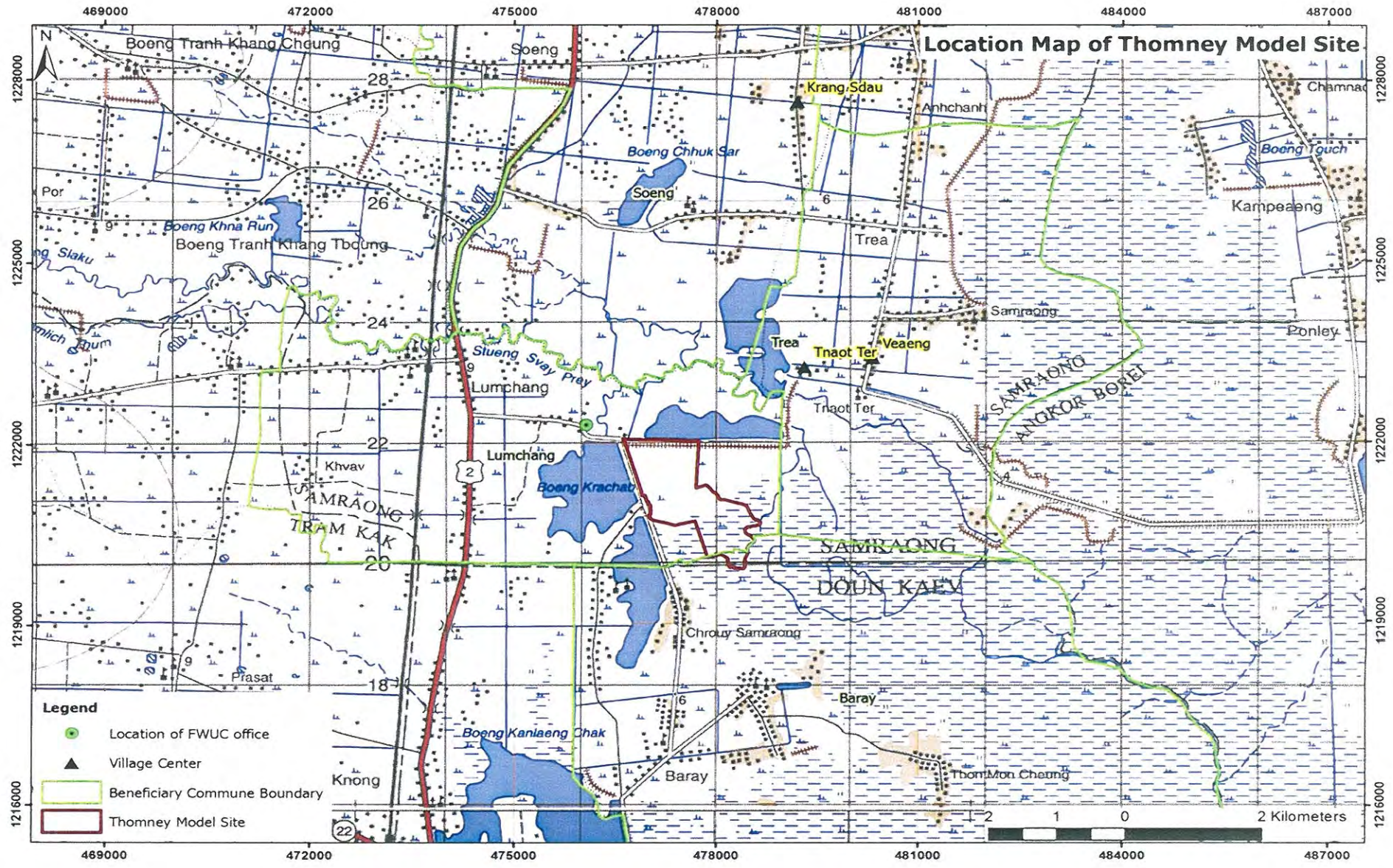
2011.12-2012.06

-  Secondary and Tertiary Canal
-  Secondary Canal (Simple Rehabilitation)
-  Delivery canal
-  Passing
-  Check Structure
-  Distribution Box
-  Turnout
-  Tail Structure
-  Small distribution box
-  Drainage Pipe Culvert

2012.12-2013.03

-  Embankment Road
-  Secondary and Tertiary Canal
-  Delivery canal
-  Check Structure
-  Distribution Box
-  Distribution Box
-  Turnout
-  Tail Structure
-  Drainage Pipe Culvert





Layout Map of Thomney Irrigation Project

