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PROJECT WORKFLOW DEFINITIONS

ALCIS QUALITY MANAGEMENT SYSTEM

PROJECT CODE	AI0015		
PROJECT NAME	Resource Corridors - SE Copper Segment Pilot Study		
PROJECT MANAGER	Marcus Polley	**PROJECT DIRECTOR**	Tim Buckley
Task Description:	002		

Background

The World Bank, in collaboration with the Afghanistan Ministry of Mines and Australian Aid, is planning to develop a number of resource corridors across Afghanistan over the next 8 to 10 years. As part of the initial planning, the World Bank is conducting detailed analysis of the potential corridors that have so far been identified. Part of this analysis will cover the communities affected by the development of these corridors and the identification of potential locations for additional soft projects within the developing resource corridors. Alcis holds a range of spatial datasets that can support this analysis of the communities within the resource corridors.

Resource Corridors Task 2 Method Statement

Alcis has developed a methodology for working with multiple layers of information about the human and natural environment of Afghanistan, assigning a score for each 250m square area (a cell) within the South-East Copper Segment Corridor, to indicate their level of 'development potential'. A second process revolves around the evaluation of mean statistics within 5km square areas placed across the 'development potential' landscape, and bringing additional intelligence and local knowledge to select and refine 5km square areas of interest. Additional data sources brought in at this point include high resolution imagery and existing topographic mapping.

Part 1	**Generation of 'Development Potential' Landscape**

The method of generating the 'development potential' landscape is described in brief below. The method recognises those datasets that have a greater impact on development potential. The method has been based on trials in other parts of Afghanistan, where very good local knowledge has been used to confirm that the outputs match local conditions. Alcis knowledge of Afghanistan is based on 8 years of continuous deployment to the country, with access to unique datasets, including helicopter-based photography, sub-metre resolution satellite imagery and existing digital map data that Alcis has access to through data sharing agreements.

Roads

Cells are given a score if they fall within 5km of a road, the value of which is based on the road surface type, which is then multiplied by 2 before their integration with other layers, giving scores that range between 0 and 10.

Attribute (WTC)	Score given	Surface type
All Weather	5	x2
Fair Weather	2	x2

Markets

Cells are scored if they fall within 10km of a market, the scores being influenced by both the market type and the normal number of days of operation.

Market Type	Score given	Operating Days				
		Very High	High	Medium	Low	>=2 Days
Markets	3	x5	x4	x3	x2	x2
Bazaars	2	x5	x4	x3	x2	x2
Open-Air Bazaar	1	x5	x4	x3	x2	x2

Scores ranging from 2-15 are then re-classified into 10 classes using a 'Natural Breaks' approach.

Electricity

Annual averages of Lights-at-Night data from the DMSP satellite, covering 2008-2010, are used to determine cells with stable illumination along the corridor, which are then categorised into 11 classes, according to their level of intensity.

Original Values	Reclass Values
0 - 1	0
1 - 7	1
7 - 12	2
12 - 19	3
19 - 26	4
26 - 33	5
33 - 40	6
40 - 46	7
46 - 52	8
52 - 58	9
58 - 63	10

Agriculture

Cells which fall within areas of agriculture are scored according to the quality of agriculture present, which has taken into account areas of irrigation. Where cells do not fall within an agricultural area, they receive a score of zero.

Type	Value
Very High	**4**
High	**3**
Moderate	**2**
Marginal	**1**
NoData	**0**

District Data

Districts have been scored according to the infrastructure present, their record of development project delivery and capacity for governance. A final score is given to each cell using the formula below, giving final scores that range between 0 and 10:

Final score = ((Infrastructure) + (projects/2) + (capacity))/4

A sample of what this data consists of is shown below:

Province	District	1. Infrastructure	2. Capacity	3. Projects	Final Score
Badakhshan	Arghanj Khwah	2	10	2	3
	Argo	10	10	2	5
	Baharak	12	10	2	6

This data is based on collation of original data prepared by ISAF, CSO, MRRD and MAIL.

National Solidarity Programme Projects (NSPs)

NSP data is collected and collated by the Ministry of Rural Rehabilitation and Development (MRRD). In this dataset, cells are scored according to both $USD spent and type of project present, where project types that have a greater bearing on development alternatives are weighted higher, with the result being reclassified into 10 values. 143 different types of project are identified, with scores ranging from 1-10. These project types and scores are shown in Appendix A.

District Centres

Cells are scored from 1-10 according to both their distance to district centres, and the size of the district centre itself, the assumption being that larger, more urbanized locations are better able to access governance and security, and have a larger sphere of influence.

DC Size m²	Buffer Sizes (km) and Score									
	1	2	3	4	5	6	7	8	9	10
>= 10,000,000	40	36	32	28	24	20	16	12	8	4
>= 2,500,000 & < 10,000,000	30	27	24	21	18	15	12	9	6	3
>= 1,000,000 & < 2,500,000	20	18	16	14	12	10	8	6	4	2
>= 500,000 & < 1,000,000	10	9	8	7	6	5	4	3	2	1
< 500,000	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5

Provincial Centres

As with District Centres, cells are scored according to both their distance to provincial centres, and the size of the provincial centre itself, with Kabul being given special consideration. Again, there is an assumption that a larger provincial centre has a larger, positive sphere of influence on development potential.

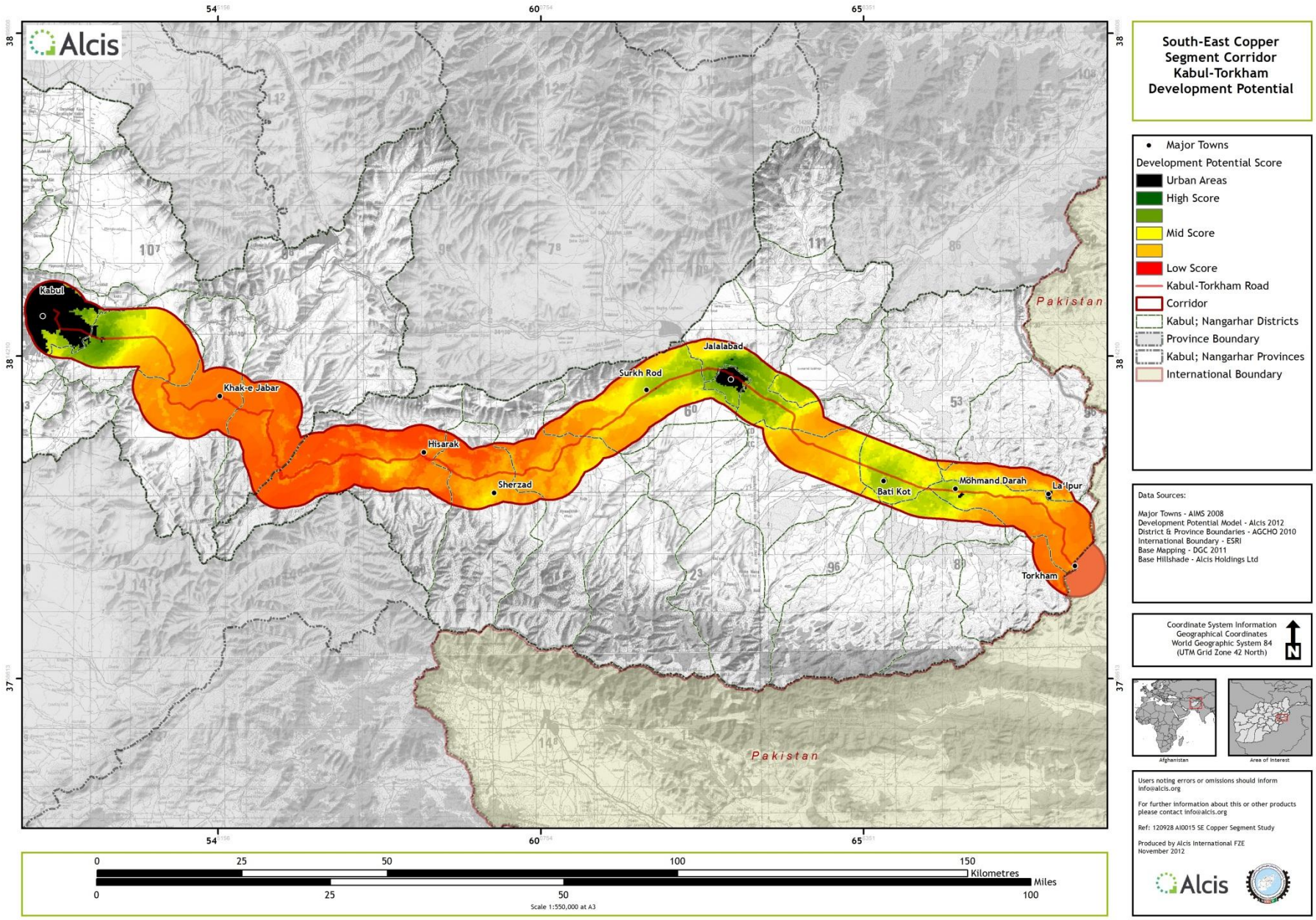
PC Size m²	Buffer Sizes (km) and Score									
	1	2	3	4	5	6	7	8	9	10
>= 10,000,000	40	36	32	28	24	20	16	12	8	4
>= 1,000,000 & < 10,000,000	30	27	24	21	18	15	12	9	6	3
< 1,000,000	20	18	16	14	12	10	8	6	4	2
Kabul	50	45	40	35	30	25	20	15	10	5

Final Weightings

Each of the scores in the layers above is multiplied according to the following table, to give a final score.

Roads	x2
Markets	X3
Electricity	X1
Quality of Agriculture	X5
District Level Data	X1
Project NSPs	X1
Distance to District Centre	X1.5
Distance to Provincial Centre	X2

The image below shows the output from stage 1 of the processing, showing the Development Potential across the South East Copper Resource Corridor.



South-East Copper Segment Corridor Kabul-Torkham Development Potential

- Major Towns

Development Potential Score

- Urban Areas
- High Score
- Mid Score
- Low Score
- Kabul-Torkham Road
- Corridor
- Kabul; Nangarhar Districts
- Province Boundary
- Kabul; Nangarhar Provinces
- International Boundary

Data Sources:

Major Towns - AIMS 2008
Development Potential Model - Alcis 2012
District & Province Boundaries - AGCHO 2010
International Boundary - ESRI
Base Mapping - DGC 2011
Base Hillshade - Alcis Holdings Ltd

Coordinate System Information
Geographical Coordinates
World Geographic System 84
(UTM Grid Zone 42 North)

N

Users noting errors or omissions should inform info@alcis.org

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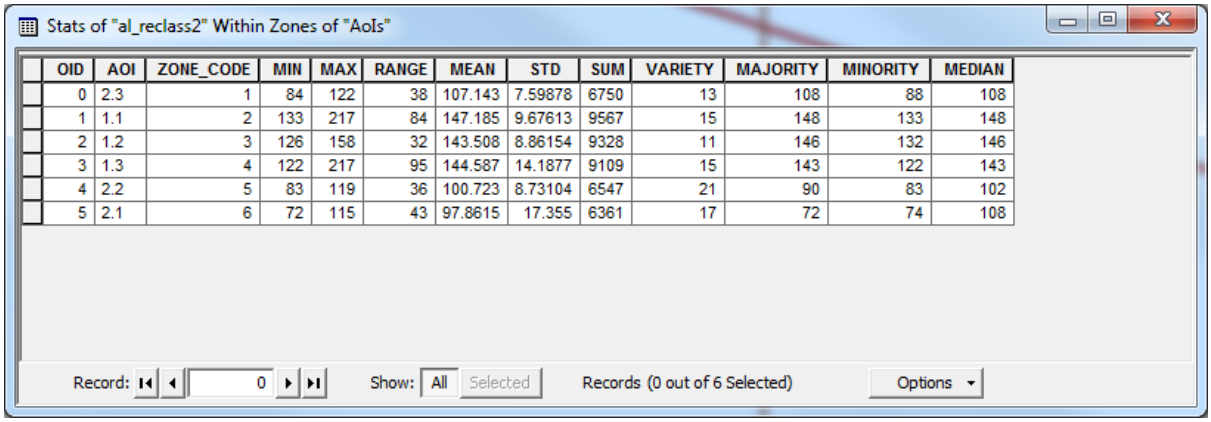
Alcis

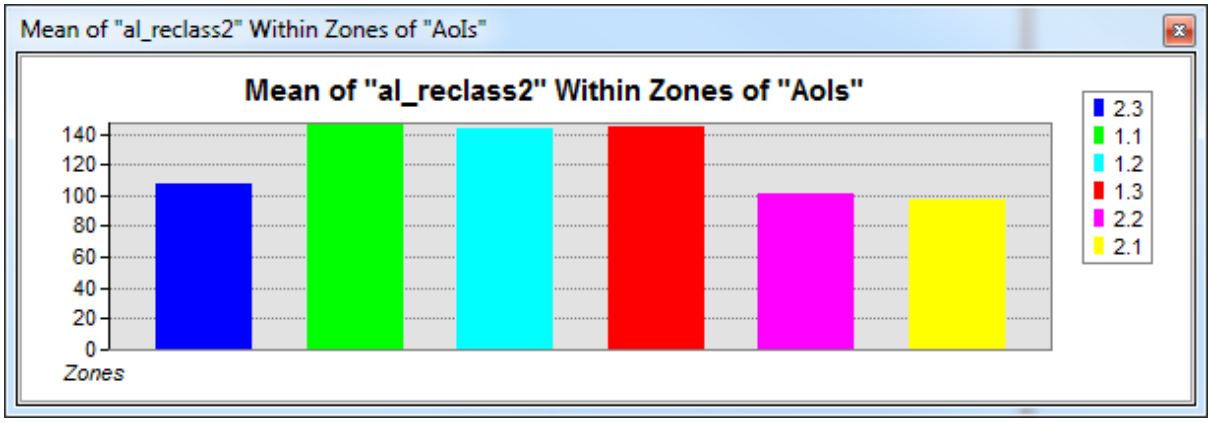
Part 2	Area of Interest Selection

GIS provides the tools to allow multiple Areas of Interest (AOIs), each 5km squares, to be evaluated against the underlying 'development potential' landscape, allowing comparisons of statistics to guide positioning and final selection of those AOIs that meet the project criteria.

Alcis has used mean 'development potential' scores close to 100 and 140 as the basis to select AOIs that are either 'most advantaged' or 'less advantaged', as shown in the table and graph below:



OID	AOI	ZONE_CODE	MIN	MAX	RANGE	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN
0	2.3	1	84	122	38	107.143	7.59878	6750	13	108	88	108
1	1.1	2	133	217	84	147.185	9.67613	9567	15	148	133	148
2	1.2	3	126	158	32	143.508	8.86154	9328	11	146	132	146
3	1.3	4	122	217	95	144.587	14.1877	9109	15	143	122	143
4	2.2	5	83	119	36	100.723	8.73104	6547	21	90	83	102
5	2.1	6	72	115	43	97.8615	17.355	6361	17	72	74	108



The above graph shows three squares that are considered ‘most advantaged’ and three that are ‘less advantaged’ factor, as confirmed through knowledge of local conditions in parts of the region. These are ordered from left to right along the South East Copper Segment Resource Corridor.

APPENDIX A:

National Solidarity Programme Project Scores:

Agriculture		**Emergency Response**		**Extension**	
Construction		**Construction**		Canal	8
Chicken farm	10	House Building (Shelter)	1	Karez	5
Cold Storage	10	**Rehabilitation**		Pipe Scheme	4
Husbandry Farm	10	House Building (Shelter)	1	Protection Wall	4
Distribution		**Health**		**Rehabilitation**	
Fertilizer	10	**Construction**		Aqueducts	8
Planting		Clinic Boundary Wall	1	Canal	8
Planting	10	Clinic Building	2	Dam	8
Service		Hospital Building	4	Dam Diversion	8
Beekeeping	9	Pharmacy Building	2	Drainage	7
Education		**Extension**		Intake	5
Construction		Clinic Building	3	Karez	5
High School Building	1	**Irrigation**		Pipe Scheme	4
Kindergarten Boundary Wall	1	**Cleaning**		Siphon	4
Kindergarten Building	1	Canal	8	Spring Box	5
Primary School Building	1	Dam	8	Super Passage	6
School Boundary Wall	1	Drainage	8	Water Reservoir	7
Secondary School Building	1	Intake	8	**Livelihood**	
Training Center	1	Karez	5	**Construction**	
Extension		Spring Box	5	Bakery	7
High School Building	1	Stream	5	Flour Mills	9
Primary School Building	1	**Construction**		Market	#
Secondary School Building	1	Aqueducts	8	Store	8
Rehabilitation		Canal	8	**Rehabilitation**	
High School Building	1	Dam	8	Bakery	5
Primary School Building	1	Dam Diversion	8	Flour Mills	6
School Boundary Wall	1	Drainage	7	**Supply**	
Secondary School Building	1	Gabion Wall	4	Animal Raising	8
Supply		Intake	5	Carpet Looms	7
School Furniture	1	Karez	5	Embroidery Machine	7
School Supply	1	Pipe Scheme	4	House Ware (Rental)	7
Training		Protection Wall	4	Tailoring Machine	7
Literacy Course (Female)	3	Siphon	4	Wool Spinning	7
Literacy Course (Male)	3	Spring Box	5	**Weaving**	
Vocational Training	6	Stream	5	Carpet Looms	7
		Super Passage	6		
		Water Divider	5		
		Water Reservoir	7		

Power		**Transport**		**Construction**	
Construction		**Basic Access**		Latrine	1
Micro-Hydro Power Plants	9	Secondary Road	7	Public Bath	1
Power House	9	Tertiary Road	5	Toilet	1
RCC Power Poles	7	**Bituminous Pavement**		Water Filtration Chambers	3
Steel Power Poles	7	Secondary Road	8	Water Supply Network	2
Installation		Tertiary Road	6	Water Supply Reservoir	2
Micro-Hydro Power Plants	9	**Construction**		**Education**	
Transformer	9	Bridge	7	Hygiene Education	2
Rehabilitation		Culvert	2	**Extension**	
Gas Network	9	Foot Bridge	5	Water Supply Network	2
Micro-Hydro Power Plants	9	Pathway	5	**Installation**	
Power House	9	Retaining Wall	1	Hand Pump	2
Supply		Side Ditch	1	**Rehabilitation**	
Diesel Generator	8	Wash	1	Public Bath	1
Micro-Hydro Power Plants	9	**Gravelling**		Shallow Well	2
Power line	9	Secondary Road	7	Water Filtration Chambers	3
Solar Panel	10	Tertiary Road	5	Water Supply Network	2
Wind Mills	10	**Rehabilitation**		Water Supply Reservoir	2
Public Building		Culvert	1	**Supply**	
Construction		Foot Bridge	5	Water Tanker	2
Administrative Building	1	Pathway	5		
Mosque	1	Retaining Wall	1		
Rural Development		**Stone Pavement**			
Construction		Secondary Road	7		
Community Centre	1	Tertiary Road	5		
Community Centre Boundary Wall	1	**Water Supply & Sanitation**			
Sport Center	1	**Boring**			
Extension		Deep Well	8		
Community Centre	1	Shallow Well	7		
Rehabilitation		**Cleaning**			
Community Centre	1	Water Filteration Chambers	3		