

1. **Definitions** – per CH-01, in addition to the following:


- A. Standard Starting Resources – 200 of each resource: food, wood, gold, and stone, prior to application of civilization bonuses.
- B. Nomad – A map where players do not start with a Town-Center.
- C. Rule Changes – Invisible alterations to game mechanics which cannot be immediately and exactly quantified by players as the match unfolds, but still impact play. For example giving boars twice as much food is not a “Rule Change” because players can click on the boar to see how much food it contains. Doubling the rate at which food is gathered from boars is considered a rule change, because such a mechanic is not immediately obvious to players, and cannot be inspected during play.
- D. Build Time – The amount of time required for a single villager to construct a building, prior to application of civilization bonuses.
- E. Design-Critical Terrains – Surfaces introducing different game-play mechanics, defined in Table 1 below:


CLASS	Walk-Able?	Navigable ?	Buildable?	Resources ?	Examples
ICE	Yes	No	No	No	ICE, DLC_ROCK, DLC_BOGLAND
GROUND	Yes	No	Yes	Yes	GRASS, DESERT, SNOW
BEACH	Yes	Yes	Only Walls/Docks	No	BEACH, DLC_WETBEACH, DLC_GRAVELBEACH
SHALLOW	Yes	Yes	No	No	SHALLOW, DLC_NEWSHALLOW, MUDDY_SHALLOW
WATER	No	Yes	No	No	WATER, MED_WATER, DEEP_WATER
MANGROVE	Yes	Yes	Yes	Yes	DLC_MANGROVESHALLOW, DLC_MANGROVEFOREST


Table 1: Design-Critical Terrain Classes in Age of Empires II

In the case of terrain masking, these definitions apply to the bottom layer because that is where the terrain properties are inherited from.

Bill of Materials:		Alchemy AOE	SPC-5	Revision
CH-01	Definitions			-
		Random Map Requirements, General		
		----- Document Approvals -----		Date:
		Prepared:	TechChariot#4776	2023/10/26
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	<p>F. Forest Tree – Any tree-class object (including, but not limited to: as oak forest tree, pine tree, palm tree, reed, bush, etc.) placed on forest terrain such that it can be built over only after all its stored wood is removed.</p> <p>G. Support – The map loads properly and within 60 seconds for the given configurations/settings without crashing the game or failing to spawn any players. Such players receive the same number of resources, without bias in terrains, elevations, objects, etc. Does NOT mean that the configuration/settings are recommended by the creator, or predicted to result in an enjoyable or entertaining game. The map will load as requested and everyone will have the same potential for an equally wonderful or terrible experience.</p> <p>2. Overview – This document defines the general characteristics of random map scripts used in Alchemy Age of Empires II competitions.</p> <p>3. File – Players need to be able to load the Random Map successfully, without excessive waiting for the file to transfer in lobby or parse during game start-up</p> <p>A. Nature – The random map shall be contained in a single text file with .rms extension</p> <p>B. No XS – The random map shall not reference or be influenced by e(x)ternal (s)ubroutines (XS).</p> <p>C. Size – The total size of the containing file shall not exceed 2,500 kilobytes.</p> <p>4. New Work – The random map shall not, at the time of its submission, have a Liquipedia article: https://liquipedia.net/ageofempires/Category:Age_of_Empires_II_Maps</p> <p>5. Own Work – The script for the random map shall originate entirely from the person who submitted it for competition use. This includes written lines of code, and block code compiled by a computer program from inputs that were selected by the random map creator.</p> <p>6. Submission Location – Submission of a map for use in an Alchemy AOE event is an agreement that it will be used to expand our collection of random map scripts. The file shall be maintained, at least until conclusion of the parent competition, within a logical sub-folder of the Alchemy AOE random map script repository: https://github.com/TechnicalChariot/Alchemy-AOE-Community-Random-Map-Scripts.</p> <p>7. Player Setup – This section describes the player starting conditions, including geometric arrangement of starting locations and changes to the game data that appear after the map loads.</p> <p>A. Resources – With exception of civilization bonuses, players shall start with standard resources.</p> <p>B. Player Number & Teaming Configurations – The Alchemy AOE Community does not exhibit unfinished work. At a minimum, the random map shall support the following common configurations:</p> <ol style="list-style-type: none"> 1. 1v1 on a 2-player map size 2. 2v2 on a 4-player map size 3. 3v3 on a 6-player map size 	
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	<ol style="list-style-type: none"> 4. 4v4 on an 8-player map size or “giant” map size 5. 2v2v2v2 on an 8-player map size or “giant” map size 6. “No Teams” or “Free-For-All” style, on a map size equal to the number of players, rounded up if there are an odd number of players. <p>C. Nomad Starts – The following special rules for Nomad supersede any conflicting requirements:</p> <ol style="list-style-type: none"> 1. Timing – Nomad maps tend to have slower starts, as a suitable starting location must be found and selected, and then a Town-Center built. It is important that viewers of an Alchemy AOE competition do not become bored and click away during this set-up time, before action can begin. Within the first five minutes, players shall be capable of establishing both of the following: <ol style="list-style-type: none"> a. Resource income to sustain constant unit production. b. At least one production building from which those units may generated. 2. Resources – Nomad maps shall have the standard starting resources, but with +275 wood and +100 stone. 3. Arrangement/Position – Nomad Maps are exempt from any Random Arrangement or Team Position requirements. Any object placed using “find_closest” in a Nomad Map is still required to satisfy the Positional Fairness requirement. <p>D. Random Player Arrangement – Exploration is an important aspect of competitive Age of Empires, and the need to find an opponent should be weighed against discovery of resources and other economic management (such as pushing deer or blocking boars). Therefore one of the following must be true to ensure sufficient randomness to create the need for scouting:</p> <ol style="list-style-type: none"> 1. Players shall be placed using “random_placement”, or “grouped_by_team”, in combination with “create_player_lands”. 2. Players shall be placed using “direct_placement”, with lands assigned using “assign_to”. In this case, <i>each</i> player shall have at least eight unique starting locations that are more than 2% distant in both x and y coordinate from each other. 3. Location Swap – Starting locations that could belong to other players are not counted in the above. For example, if blue starts at [25,25] and red starts at [75,75], then a reversal where blue is at [75,75] and red starts at [25,25] is not counted toward the threshold of starting location randomness, since this effect could be achieved by randomly assigning different colors to the <i>same location</i>. <p>E. Positional Fairness – The geometric center for each team’s starting locations shall be approximately equidistant from location [50,50] (the center of the map).</p> <p>F. Team Positions – If the map is used in a team-game competition, then players will need to have an idea of who will be flank or pocket. When “team positions” is activated in lobby, a clockwise sweep from lowest number shall order the players as follows, in one of two configurations:</p> <ol style="list-style-type: none"> 1. First Ordering: 1 (blue), 3 (green), 5 (cyan), and 7 (grey) against 2 (red), 4 (yellow), 6 (purple), and 8 (orange) 2. Second Ordering: 1 (blue), 3 (green), 5 (cyan), and 7 (grey) against 8 (orange), 6 (purple), 4 (yellow), and 2 (red) <p>If a linear pattern is used for player placement, then “clockwise” is simply “left to right”.</p>	
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<p>G. Rule Changes – Game mechanics should be intuitive so that players are not discouraged from signing up for the Alchemy AOE competition. Therefore, the following apply:</p> <ol style="list-style-type: none"> 1. The random map shall not invoke a “guard_state” to alter the mechanics or win conditions of the game. 2. The random map shall not invoke a “terrain_state” to alter the terrains suitable for the construction of new buildings. 3. The random map shall not use “effect_amount” or “effect_percent” to invoke changes to player starting resources or general game rules. 4. The random map shall not use “effect_amount” or “effect_percent” to invoke rule changes that impact any player-controlled objects or gaia objects intended to interact with players, with the following exceptions: <ol style="list-style-type: none"> a. The player is only able to control the unit by starting with it. The unit is un-trainable. b. Each player gains the ability to build up to one thematic building in the Dark Age, meeting the below requirements: <ol style="list-style-type: none"> 1. If the building is capable of producing villagers, then it shall cost no less than 275 wood and 100 stone, and have build time no less than 150 seconds. 2. If the building is capable of producing fishing ships, then it shall cost no less than 150 wood, and have build time no less than 35 seconds. 3. If the building is capable of producing military units, then it shall cost no less than 175 wood, and have build time no less than 50 seconds. 4. If the building is capable of producing trade units, then it shall cost no less than 175 wood, and have build time no less than 60 seconds. 5. If the building is capable of producing herdables (such as sheep, turkeys, etc.), then it shall cost no less than 100 wood, and have build time no less than 35 seconds. 6. If the building is capable of providing population space, then it shall cost no less than 25 wood, and 25 seconds of build time, for every 5 population provided. E. G. A ten population hut requires 50 wood and 50 seconds to build using a single villager. 7. Buildings with multiple capabilities, as listed above, shall have the cost and construction time of the most expensive option, plus $\frac{1}{2}$ the cost and construction time of all other options added. For example, if rules are changed giving players the ability to construct a building from which villagers, military units, and herdables may all be trained, then the cost of such a building would be $(275 + 175/2 + 100/2)$ wood = 413 wood and 100 stone minimum, with build time $(150 + 50/2 + 35/2)$ second = 193 seconds minimum. c. Each player gains the ability to train up to two thematic units at an appropriate building in the Dark Age, meeting the below requirements. <ol style="list-style-type: none"> 1. Range shall not exceed 1. 2. If a combat unit, unmitigated damage output (before armor of defending unit) shall not exceed 8 damage per second, per 80 resources of investment and 21 seconds of training time. Unit speed shall not exceed 0.9 tiles/second, and vision shall not exceed 4 tiles. Unit armor shall not exceed 0 melee, 1 pierce, and hit-points shall not exceed half of the unit’s total resource cost. 3. If a resource-collection unit, statistics (including training rate), shall not exceed those of their closest standard-rules analog. 4. If a harvestable unit (such as sheep), then it shall yield food and cost no less than $\frac{1}{4}$ that food yield in wood to produce. Training time shall be no less than 25 seconds for every 100 food contained in the unit. Other statistics shall not exceed those of the 		
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closest standard-rules analog.

- 8. Land Generation** – The random map shall present an arrangement of neutral lands that are approximately equal in total distance from the geometric center of all team starting locations, illustrated per the example of Figure 1:

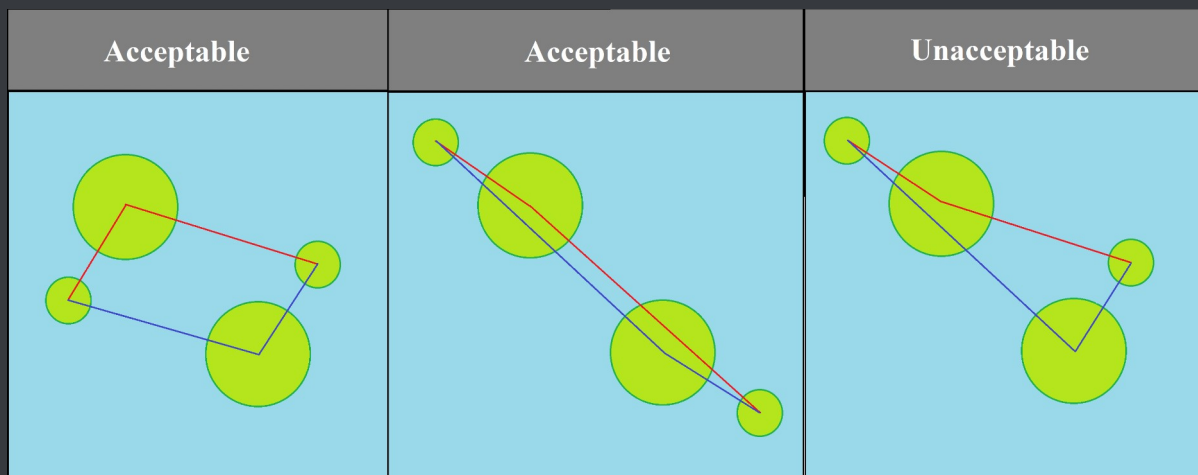



Figure 1: Example of Acceptable and Unacceptable Neutral Land Distribution

For the left and central panes in the above figure, the total distance of the blue lines and red lines are approximately equal. However, in the right pane, the sum of the blue lines is significantly larger than the sum of the red lines, which gives red an unfair – and unacceptable– advantage.

- 9. Elevation Generation** – The random map should have a fair distribution of hills, whose heights are not to tall that screens may fail to render them:
- Maximum Height – Maximum elevation shall not exceed 16.
 - Fairness – Elevation shall be uniformly distributed across the random map, without bias toward any edge or team.
- 10. Terrain Generation** – The random map should have a fair distribution of terrains, per the following:
- Design Critical Terrains – The random map shall not bias any class of design-critical terrains in favor of any one team.
 - Forest Impingement – Forest trees shall avoid all starting Town Centers by at least 6 tiles.
 - Forest Access – The random map should provide equal access to forests. Players shall have approximately the same number forest trees within a 6 to 30 tile radius of any starting Town Center. Simple tree objects within this distance shall not exceed 2 per group, or constitute more than 10% of the unharvested wood within a 30 tile radius from the starting Town Center.
- 11. Objects Generation** – The random map should have a fair distribution of objects, per the following:
- Player-Assigned Objects – Objects that start the game under the control of players should meet the following requirements:
 - With exception of civilization-specific bonuses, the random map shall assure players the same quantity of starting units and buildings, including gaia objects immediately converted at the start of the game.
 - Equal utility of starting objects shall be assured; no starting unit shall be entrapped by forests

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	<p>or other resources, and no starting building shall be pinned against forests or other resources, such that units it might create would be trapped.</p> <ol style="list-style-type: none"> 3. Starting Combat Units – Starting units with the ability to attack or convert cannot be allowed to pose a serious threat to an opponent’s Dark Age economy. This includes units spawned through the deletion of a starting unit. Therefore: <ol style="list-style-type: none"> a. Starting units capable of reaching enemy resource collection, (from being compatible with the same class of terrain) shall have range less than or equal to 1. b. On maps where players start with a garrison-able building within 15 tiles of all villagers, the combined attack efforts of all starting military units shall be insufficient to kill a loomed villager (fighting back) at full health, even after achieving “the first hit”. c. On maps where players start without a garrison-able building within 15 tiles of all villagers, no starting military unit shall be capable of harming any villagers. B. Gaia Objects – These objects start the game as neutral and are under the control of gaia. They can be resources, or hostile units/buildings. The following conditions apply: <ol style="list-style-type: none"> 1. Gaia Convertible Objects – With the following exceptions, the random map shall have no convertible gaia objects: <ol style="list-style-type: none"> a. The object is assured conversion at the start of the game, placed within the vision and capture radius of player-controlled objects. b. The object is sheep class (such as sheep, turkey, llama, goat, etc.) such that gaining control of it due to random scouting is not regarded as a large advantage. c. The object is a building of approximate equidistance from the team starting locations, that changes control depending on the player who was last closest to it (such as a monument). 2. Resources – The random map should have a fair distribution of resources, including (but not limited to) animals, forage bushes, gold and stone mines, fish, and relics. The following requirements apply: <ol style="list-style-type: none"> a. Player-Assigned: Resources that are within 30 tiles of starting Town Centers are “player assigned”. Each player shall receive the same number of such resources, at the same distances from the Town Center. NOTE: Nomad maps tend not to have Player-Assigned resources. b. Neutral: Resources that are more than 30 tiles away from starting Town Centers are “neutral”, and tend toward lower scrutiny by nature of being less relevant to the early game. Neutral resources shall exhibit no bias toward any team. 3. Gaia Hostile Objects – Hostile Gaia Objects are unconvertible and may attack nearby player units or buildings. Gaia hostile objects shall avoid player starting Town Centers by 30 tiles minimum. If players do not start with a garrison-able building within 15 tiles of all villagers, then Gaia Hostile Objects are forbidden. <p>12. Regicide Game Mode – The random map shall support regicide mode.</p> <p>13. Artificial Intelligence – The random map shall be playable by the standard AOE2 DE artificial intelligence.</p> <p>14. Free For All Trade Restriction – The random map shall disable trade cart and trade cog units, at the market and dock respectively, for situations where it is played with an excess of two teams. Neither human nor AI players shall be capable of producing such units in that case.</p>	
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