Year 13 Mark Scheme January 2014.

Section A

AVAILABLE MARKS

1 (a) (i) This delta was formed at the mouth of the Fitzsimmons Creek river and could be described as "arcuate" in shape as it is comprised of multiple distributary channels with its outer edges shaped like an arc of a circle. The landform has progressively grown outwards in a north-western direction into Green Lake. Although the rate of growth varies, it has extended approximately 220 m since 1947.

Marks are awarded for a **description** of delta growth.

Award [3] for a detailed description of delta growth. Relevant evidence is extracted from **Resource 1B**.

Award [1]–[2] for a less detailed **description** of delta expansion. Resource evidence may be more limited and the quotation of relevant values may be omitted. [3]

(ii) There are particular **processes** which encourage delta formation. This delta has formed at the mouth of the high energy Fitzsimmons Creek river which **transports** a high annual sediment volume of 20 000 Mg/year. Sediment yield is obviously maximised by the partial vegetation cover of the drainage basin and the discharge level of the river in flood conditions. As river velocity decreases on entering Green Lake (a standing body of water) the reduced competence and capacity of the river results in **deposition**. The foreset beds, composed of medium calibre sediment are deposited on top as a steep angled wedge. The topsets beds consist of horizontal layers which settle on top and are comprised of coarse calibre sediment. The process of **braiding** results in the formation of multiple distributary channels. Deltas form where the rate of sediment deposition exceeds the rate of removal and obviously the lack of wave action in Green Lake reduces sediment removal allowing this delta to expand over time. Furthermore, vegetation **colonisation**, as evident in the image (**Resource 1B**) facilitates the stabilisation of sediment through the process of **bioconstruction**.

Level 3 ([5]–[6])
A comprehensive response demonstrating detailed knowledge and understanding of delta building processes with the effective integration of the contextual spatial resource material. Specialist terminology is employed with accuracy. The level of written communication is excellent.

Level 2 ([3]–[4])
An answer which displays a reasonably broad knowledge of delta formation. There may be some obvious omissions in content and/or key terminology. For [4] marks some attempt has been made to relate the spatial resource materials into the explanatory answer. The level of written communication is good.

Level 1 ([1]–[2])
A more simplistic response, displaying a more basic grasp of the delta formation processes. There may be little or no relevant resource material included and an obvious lack of specialist terminology. The level of written communication may be basic.

Maximum of [3] marks for an answer which provides an accurate and

detailed account of the delta formation processes with no appropriate reference to the Resources. [6]

AVAILABLE MARKS

(b) (i) Dredging involves the excavation of deposited silt from the bed of a channel, often achieved through the use of heavy industrial pumps or filters. Supporters of dredging argue that it reduces flooding as it enlarges the channel capacity, allowing a larger volume of water to flow more rapidly and efficiently through the drainage basin to the sea. It is evident that the temporary flood management materials placed by the residents on the river bank have proved to be ineffective to the rising river levels.

Award [2] for a coherent answer which displays a sound awareness of **both** how dredging is achieved and its purpose in river management.

Award [1] for an answer which accurately addresses one of the above aspects of the answer. [2]

(ii) Sustainable river management involves an extension of our temporal and spatial parameters to consider the consequences of decisions for the future and for communities living further afield. "Soft" engineering techniques work with the local people and the environment to reduce flooding. They may be less expensive and thus more economically sustainable. Candidates may select a method such as floodplain zoning, afforestation, wetland restoration, flood warnings etc.

Mark Breakdown (2 x [2]):

Award up to [2] for an answer which identifies a sustainable river management technique with an understanding of **how** it works.

Award up to [2] for an awareness of how their chosen strategy provides sustainable and environmentally sensitive management. [4]

15

SECTION 2 - GLOBAL BIOMES.

2 (a) **Resource 2A** illustrates the Tropical Rainforest biome which is located in the Amazon Basin (South America), the Congo River Basin (Western Africa) and Indonesia (South East Asia). There is also smaller coverage in areas such as Central America.

The breakdown of marks is as follows:

Award [1] for the identification of the Tropical Rainforest biome.

Award up to [2] for a description of their distribution with accurate recognition of places. [3]

(b) (i) Autotrophs, such as diatoms, eel grass etc, are the primary producers in the Silver Springs ecosystem. These organisms can harness solar energy and utilise water and carbon dioxide to photosynthesise and provide energy (glucose) for the heterotrophs, such as the turtles, snails, mullets etc.

Award [3] for a coherent, accurate explanation of the role of the autotrophs. The answer should include relevant theoretical content, key terminology and appropriate exemplification from **Resource 2B**.

Award [1]–[2] for an explanation which may be less complete, less

detailed or more simplistic. The answer may be theoretical with no exemplification from the ecosystem presented. [3]

AVAILABLE MARKS

(ii) There are two key elements in this question.

Mark Breakdown is as follows ([2] + [3]):

Description up to [2] for a recognition that the energy content decreases as the trophic level increases. The accurate quotation of relevant values is essential for full marks.

Explanation up to [3] for an awareness that energy transfer is not 100% efficient and thus the proportion declines at each progressive trophic level. Energy can be lost from the producers as a result of respiration or metabolic cell processes. Losses from the consumers include heat, waste, movement, digestion, reproduction etc. [5]

(ii) The images present evidence of the **actual** impact of permafrost thaw. Housing subsidence and damage to infrastructure (the highway) is evident. Thus financial projections indicate that an additional cost of up to $6.1 billion will be required to update infrastructure between 2006 and 2030 as a result of climate change.
Thawing of permafrost, as a result of increased temperatures/climate change, alters the stability of the active layer of the soil with a potentially adverse impact on building foundations and support structures. The loss of mechanical strength results in subsidence and costly damage to infrastructure.

Mark Breakdown as follows:
Description [2]

- Description of **actual** evidence displayed in images.
- Description of **potential** financial impact displayed in the bar chart.

Explanation [2]
Award up to [2] marks for an understanding of the cause of infrastructural damage and cost in relation to permafrost thaw and subsequent subsidence. [4]

AVAILABLE MARKS

15