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To Whom It May Concern

**Planning Act 2008 – Section 89 and The Infrastructure Planning (Examination Procedure) Rules 2010**

**Application by H2Teesside Limited for an Order Granting Development Consent for the H2Teesside Project**

**Unique Reference: 20049379**

**Response to Deadline 2 – Written Representation**

This letter is sent on behalf of Sembcorp Utilities (UK) Limited (“Sembcorp”), registered as an Interested Party for the above application, in accordance with Deadline 2.

Written Representation

Please see below for Sembcorp’s additional Written Representation.

I trust that the below is clear however please do not hesitate to contact me should you have any queries.

Yours sincerely

**Zara Darragh**  
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## Sembcorp Written Representation

1. **Introduction**
  - 1.1 We are instructed to make the below written representation to be submitted by deadline 2 on behalf of Sembcorp.
  - 1.2 The previous submissions made in Sembcorp's Relevant Representation are not repeated here and should be read together with these further written representations.
2. **Safety of above ground H2 pipelines**
  - 2.1 Sembcorp has now been able to consider in greater detail the Applicant's Pipeline Statement (document ref 5.5) as well as Chapter 20 of its ES "Major Accidents and Disasters". These documents describe the approach to the Applicant's pipeline connections design as well as its assessment of the potential impacts and effects on Major Accidents and Disasters. Following this consideration, Sembcorp is concerned about the safety of those parts of the Applicant's network comprising above-ground hydrogen pipelines and questions whether, fundamentally, this is a safe approach which is ALARP (as defined in paragraph 20.2.5 of Chapter 20 of the ES).
    - 2.2 There are a number of issues regarding the safety of the proposed above ground hydrogen pipelines:
      - 2.2.1 Hydrogen has a high molecular diffusivity and so there is greater propensity for leaks from pipelines and associated infrastructure.
      - 2.2.2 Hydrogen has a wide flammability range (4 to 75% concentration in air, by volume) compared to other fuels.
      - 2.2.3 A 100% hydrogen flame is nonluminous and doesn't emit a large amount of heat, non-odorous and will not produce smoke when burned, meaning it is significantly difficult to detect.
      - 2.2.4 From a pressurised pipeline context a hydrogen leak will be projected by the pressure behind it in orientation of the leak point which may lead to explosive mixtures forming and or jet fires in localised areas, due to its minimum ignition energy (10x less than methane).
      - 2.2.5 Hydrogen can accumulate in enclosed spaces depleting the atmospheric oxygen levels causing asphyxiation.
      - 2.2.6 Above ground hydrogen pipelines are more susceptible to variations of ambient conditions. This can introduce the need for additional temperature control of the hydrogen.
    - 2.3 In addition to these inherent risks, the proposed location of the Applicant's hydrogen pipelines introduces further risks. There are a number of existing pipeline assets (many of which themselves convey hazardous substances) and supporting infrastructure/apparatus (steel or concrete supports, pipe bridges, cables etc) above ground in the pipeline corridors. This creates additional risks in the management of major accident hazard pipelines and the potential domino effect of other systems and apparatus in the Sembcorp managed pipeline corridor.
    - 2.4 If the hydrogen pipelines were to leak above ground, there would be a greater risk to humans, environmental health and safety, existing systems and apparatus than if they were to be routed below ground. On the basis that the soil coverage of the pipelines inherently reduces risk.

- 2.5 When the Applicant considers the concept of ALARP, there is a reference to the hierarchy of controls to mitigate identified risks. This hierarchy refers to the following order of controls, with elimination being the most effective and PPE being the least effective:
- 2.5.1 Elimination – physically remove the hazard
  - 2.5.2 Substitution – replace the hazard
  - 2.5.3 Engineering controls – isolate the hazard
  - 2.5.4 Administrative controls – change the way people work
  - 2.5.5 PPE – protect the worker with equipment

Whilst the Applicant may not be able to eliminate or substitute the hazard in this case, it can certainly seek to further isolate the hazard by burying the pipelines. This would significantly reduce the risks identified above.

- 2.6 Within the Wilton International site, Sembcorp is also concerned that there are further interactions/domino effects risks that come into play with above ground pipelines. The site has tenants that are upper and lower tier COMAH facilities and thus careful consideration is needed before introducing further risks into this complex environment. Furthermore, the site will be subject to further development and Sembcorp is concerned that the presence of above ground hydrogen pipelines may prevent development on parts of the site within the impact zones of the hydrogen pipelines.
- 2.7 In addition to this, the presence of hydrogen pipelines above ground may disproportionately use up capacity in the pipeline corridor, since greater buffers may be needed above ground to achieve appropriate separation. This in turn may impact on the ability of future projects to utilise the corridor and is not an efficient use of the limited available space remaining.
- 2.8 Route selection for pipelines in TD/1 should, as far as possible, avoid running closely parallel to high density traffic routes, railways, overhead electricity transmission lines, major pipelines or other buried plant. External interference of above ground pipelines is considered as a specific threat to pipeline integrity as indicated in TD/1 with gas pipelines being buried this significantly reduces this risk. The Applicant advises in the ES Table 20-5 the standards to be utilised will be "IGEM/TD/1 Ed.6, including Supplement 2. ASME B31.12," TD/1 is specifically related to buried pipelines and minimising above ground infrastructure on gas pipelines. Hydrogen is inherently less safe than natural gas, from a fire and explosion standpoint as detailed.

#### **Safety of the existing underground river crossing assets from the proposed diagonal crossing of the H2 pipeline**

- 2.9 The existing Tunnel 2 underneath the Tees is in the vicinity of the proposed H2 Teesside river crossing location, originally constructed in the 1970s and is currently in use. It contains vital assets allowing the transport of various substances between the east and west of the River Tees, connecting the two main industrial areas. In addition, Sembcorp also has the existing 24" natural gas pipeline and the 8" propane pipeline which follow the concept of all the current crossings being parallel. As indicated by the Applicant during ISH1, there are also a number of other assets that cross the river in this location, all of which run parallel with appropriate separation.
- 2.10 The Applicant proposes a microbore/HDD which diagonally crosses the existing assets at greater depth (although Sembcorp has not been able to establish the

precise depth etc.). The proposed diagonal crossing under the existing assets is an abnormal and undesirable routing design in this area which is deviating away from the current normal best industry practices. Significantly increasing the asset risks and liability exposure to Sembcorp and their customers.

- 2.11 The existing tunnel was constructed using a cast iron liner. Sembcorp is therefore concerned that the proposed microbore/HDD may inadvertently collide or cause damage to from vibration or cause ground movement/subsidence that causes a catastrophic failure of the liner and the tunnel itself. The impacts of the microbore/HDD activity on the geological structure supporting the tunnel may not be immediately obvious and may take a number of years to manifest. In addition to the obvious risk of a major accident/disaster, the failing of the pipeline tunnel would also be detrimental to the various businesses that rely upon the assets. It is not clear to Sembcorp what mitigations and/or separations the Applicant proposes to prevent such damage, nor how any impacts may be monitored, during and post construction.
- 2.12 The two existing Sembcorp pipelines are also of concern that the proposed microbore/HDD may inadvertently collide or cause damage to from vibration or cause ground movement/subsidence that causes a catastrophic failure of them. The impacts of the microbore/HDD activity on the geological structure supporting the pipelines may not be immediately obvious and may take a number of years to manifest. In addition to the obvious risk of a major accident/disaster, the failing of the pipelines would also be detrimental to the various businesses that rely upon them. It is not clear to Sembcorp what mitigations and/or separations the Applicant proposes to prevent such damage, nor how any impacts may be monitored, during and post construction.