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**Prepared by:****報告者：**

Ivan Cheng/Coco Lin (TL)  
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**BSI reference:****BSI參考號：**

WEST C-0047461596-00

Standard	PAS 2050:2011
Visit Type	<input checked="" type="checkbox"/> Document Review <input checked="" type="checkbox"/> Stage1 <input checked="" type="checkbox"/> Stage2

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# BSI Infrastructure Carbon Footprint Verification Report

## BSI 產品碳足跡查證報告

### 一、 Introduction 引言

This report relates to the infrastructure carbon footprint verification of the New Infrastructure of the West Coast Expressway from Badunliao to Jiukuaiquo managed by West Coast Expressway Southern Region Temporary Engineering Office.

此報告為關於公路總局西濱南臨時工程處所管理的西濱快速道路八棟寮至九塊厝新建工程的工程碳足跡查證。

The Verification was based upon the Client's the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaiquo carbon footprint Management System & Inventory Report.

Referenced below:

Infrastructure Carbon Footprint Report and CFP Inventory

此查證建立在 貴單位工程碳足跡管理系統/盤查報告書的基礎之上，具體內容參考下列信息：  
西濱快速道路八棟寮至九塊厝新建工程碳足跡盤查報告書及產品碳足跡盤查清冊

The objective of the verification: The verification was to confirm the result and calculation process of infrastructure carbon footprint is conformity with the relative regulations.

查證目標：確認公共工程碳足跡排放量盤查計算過程及成果符合相關規定

The criteria of the verification: PAS 2050:2011 and CFP-PCR for Infrastructure-Bridge

查證準則：PAS 2050:2011、環保署核准(March 21, 2017) 基礎設施-橋梁產品類別規則 (17-005)第2.0版

The scope of the verification:

It includes the validation of infrastructure system boundary which involves the GHG source or sinks from the acquisition of raw material, construction of infrastructure, and operation of infrastructure in the infrastructure life cycle.

查證範圍：確認包括了此公共工程系統邊界；牽涉此公共工程生命週期之原物料開採、建造活動、原料運送及營運等階段；所納入之溫室氣體源、匯或庫及其欲納入之溫室氣體種類及欲涵蓋之期間。

Materiality threshold: 5% of the total amount of GHG emissions

實質性門檻：排放總量之5%

This report forms part of BSI's partnership approach in the Verification of your infrastructure carbon footprint Management System.

此報告為BSI為 貴公司產品碳足跡管理系統查證的一部分。

The Verification was based on random samples and therefore nonconformities may exist which have not been identified. Due to the nature of this Verification, not all areas of the Verification have been verified.

此查證係以隨機抽樣方法進行，故某些不符合項有可能存在而未被發現。基於本次查證的性質，並非所有的範圍都被抽樣查證。

If you wish to distribute copies of this report external to the organization, then all pages must be included.

如欲提供此報告的複印件予其他機構，應保證此報告複印件頁數齊全。

## 二、 Document review 文件審查

### 2.1 Conclusion 結論

The first year progress during 3 years has been established towards CFPV Document Review and Stage 1 verification.

3年期間的第一年查證工作的進展已建立。

During the document review 0 Notices to Client (NTCs) with 2 observations (OBS) were identified.

本次文審發現共計0項改善事項及2項觀察事項。

The Initial stage1 verification of the first year is currently expected to take 6 verification man days.

第一年第一階段查證預計需要6人天數。

The second year progress during 3 years has been established towards CFPV Document Review and Stage 1 verification.

3年期間的第二年查證工作的進展已建立。

During the document review 0 Notices to Client (NTCs) with 0 observations (OBS) were identified.

本次文審發現共計0項改善事項及0項觀察事項。

The Initial stage1 verification of the first year is currently expected to take 6 verification man days.

第一年第一階段查證預計需要6人天數。

### 2.2 Verification team and relevant info in desk review (查證小組成員及文審相關資訊)

Date	Time	Assessor 查證員	Area 查證內容	Clause(s) 條文
February 17, 21, 2014	09:00-16:00	Coco Lin Stanley Kuo	PAS 2050 requirement review CFP inventory 產品碳足跡盤查清冊 PAS 2050 標準符合度審查 Report preparation	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of infrastructure 產品碳足跡計算
March 8, 2015	09:00-16:00	Coco Lin Stanley Kuo	PAS 2050 requirement review CFP invento清冊 產品碳足跡盤查報告 PAS 2050 標準符合度審查 Report preparation	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of infrastructure 產品碳足跡計算
October 24, 2015	09:00-16:00	Ivan Cheng	PAS 2050 requirement review CFP invento清冊 產品碳足跡盤查報告 PAS 2050 標準符合度審查 Report preparation	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of infrastructure 產品碳足跡計算

Date	Time	Assessor 查證員	Area 查證內容	Clause(s) 條文
February 4, 2016	09:00-16:00	Ivan Cheng	PAS 2050 requirement review CFP invento清冊 產品碳足跡盤查報告 PAS 2050 標準符合度審查 Report preparation	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of infrastructure 產品碳足跡計算
January 26, 2017	09:00-16:00	Ivan Cheng	PAS 2050 requirement review CFP invento清冊 產品碳足跡盤查報告 PAS 2050 標準符合度審查 Report preparation	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of infrastructure 產品碳足跡計算

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## 2.3 Strategic Review Commentary

Risk Assessment of verification(風險評估):

The risk assessment is broken down into the separate components of inherent, controls and detection risk, and these can be analyzed to guide the verification approach (i.e. substantive (data information systems) and controls based procedures (management control environment)).

The raw material listed above should be used as a guide for verification procedures necessary to bring verification risk to an acceptable level. (i.e. the extent to which the verification is based on testing of controls or the substantive testing of data). If verification procedures do not reduce verification risk to an acceptable level, then either more verification procedures are necessary or the participant's emission data cannot be verified, and an opinion should be issued to reflect this.

The details of risk assessment are shown as below:

實質性議題 material issues	現況 / 管制措施 (situation/control actions)	風險risk	
		現況/措施 Yes/No/ Incomplete	等級 Level
系統界限 System boundary	• 公共工程是否存在適切之產品類別規則(PCR)? Is there PCR available or drafted?	Y	M
	• 工程製程地圖/產品邊界完整清楚? Is the product functional unit and system boundary clearly defined?	Y	
	• 工程功能單位是否已清楚定義? Is the process map/system boundary clearly defined?	Y	
政策及相關管理程序 GHG policy and other management procedure	• 是否清楚定義其政策及相關碳足跡管理程序? Is there defined CFP management procedure and policy?	I	M
供應商資訊管理 Information management of suppliers	• 原物料是否管理完整? 可追溯原始單據? Is the collection of activity data reliable? Is there evidence for proofing?	I	H
原物料資訊管理 The information management of raw	• 原物料是否管理完整? 可追溯原始單據? Is the management of raw material complete? Is the original receipt or bill traceable?	I	M

實質性議題 material issues	現況 / 管制措施 (situation/control actions)	風險risk	
		現況/措施 Yes/No/ Incomplete	等級 Level
materials	<ul style="list-style-type: none"> <li>運輸分配假設是否為合理？可否提供相關的佐證證據？ Is the allocation supposition for transportation reasonable or clearly defined and traceable for original receipt or record?</li> </ul>	Y	
建造資訊管理 The information management of own operation	<ul style="list-style-type: none"> <li>能源是否管理完整？相關的能源使用分配是否清楚且都可追溯原始單據？ Is the energy completely managed? Is the allocation for energy use clearly defined and traceable for original receipt or bill?</li> </ul>	Y	M
	<ul style="list-style-type: none"> <li>運輸分配假設是否為合理？可否提供相關的佐證證據？ Is the allocation supposition for transportation reasonable or clearly defined and traceable for original receipt, record or bill?</li> </ul>	Y	
	<ul style="list-style-type: none"> <li>工程施作過程中廢棄物是否管理完整？廢棄物處理分配假設是否為合理？可否提供相關的佐證證據？ Is the waste of own process completely managed? Is the allocation for waste treatment clearly defined and traceable for original receipt, record or bill?</li> </ul>	Y	
產品最終處置資訊管理 The final disposal information management of product	<ul style="list-style-type: none"> <li>產品最終丟棄方法為已知且被記錄的？(如廢棄物丟棄至掩埋廠，焚化廠及廢水廠等) Is the final disposal method of product known and recorded? (e.g. waste disposed of through landfill, incineration, burial, wastewater)</li> </ul>	NA	---
	<ul style="list-style-type: none"> <li>最終丟棄分配假設是否為清楚？可否提供相關的佐證證據？ Is the allocation for final disposal clearly defined and traceable for original receipt, record or bill?</li> </ul>	NA	
使用階段情境假設 The use phase scenario supposition	<ul style="list-style-type: none"> <li>與PCR界定之系統邊界一致嗎？ Is it conformity with the system boundary definition of PCR?</li> </ul>	Y	M
	<ul style="list-style-type: none"> <li>產品使用階段的評估是記錄且保存的嗎？ Is the product use phase assessment recorded and retained?</li> </ul>	N	
	<ul style="list-style-type: none"> <li>對於使用階段所採用的GHG計算是否合理？ Is it reasonable for usage GHG emission calculation?</li> </ul>	Y	
計算方法與引用係數 Calculation method and conversion factors	<ul style="list-style-type: none"> <li>是否引用資料庫之係數？ Is there any introduction of factors from database?</li> </ul>	Y	M
	<ul style="list-style-type: none"> <li>是否計算方法是一致且透明的？ Is the calculation method consistent and transparent?</li> </ul>	Y	
	<ul style="list-style-type: none"> <li>排放量是完整且準確的嗎？ Are the emissions complete and accurate?</li> </ul>	I	
	<ul style="list-style-type: none"> <li>資料庫的係數合理反映CFP的狀態嗎？ Does the factor from database reasonably reflect the status of CFP?</li> </ul>	I	
量測及儀校管理 The management for equipments of measurement and calibration	<ul style="list-style-type: none"> <li>儀表數據之量測頻率是否合理？ Is the period for measuring instrument reasonable?</li> </ul>	Y	L
	<ul style="list-style-type: none"> <li>各量測設備的校正方式與頻率皆正常？ Are the frequency and method for calibration of measuring instrument normal?</li> </ul>	Y	

Result of infrastructure LCA assertion review (產品碳足跡報告書審查) :

The following information will be updated as necessary as information is evaluated during the review, risk verification and planning stages.

The information upon which this review is based has been derived from submitted documentation as following:

Completed PVQ (pre-verification questionnaire)  
Source list and relative calculation records  
Document - 2013工程碳足跡盤查清冊  
WH77-A/B/C標2014工程碳足跡盤查清冊

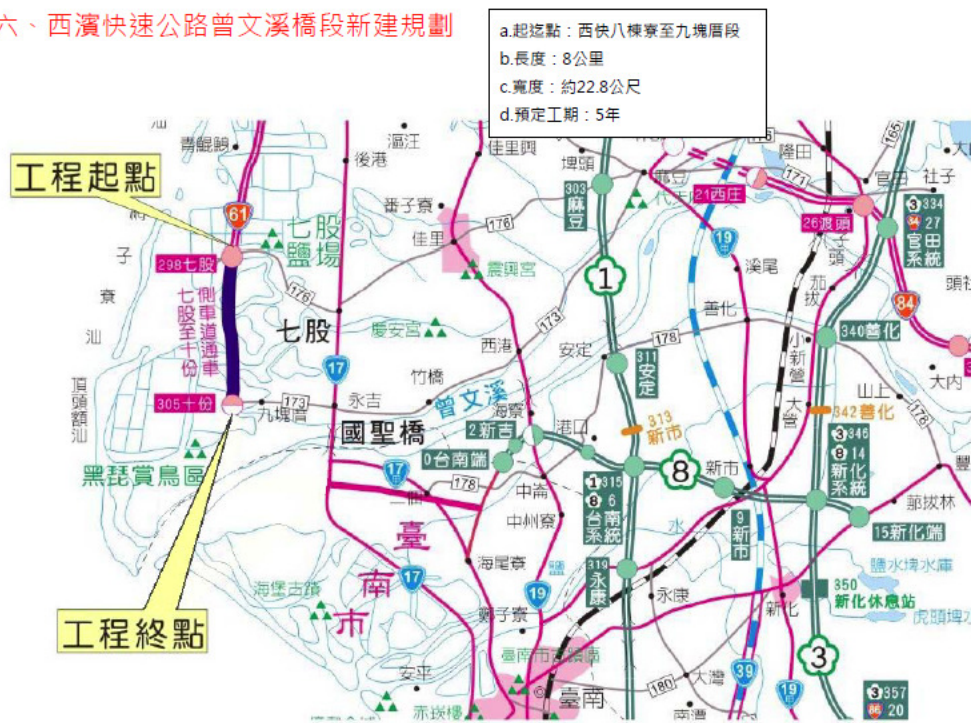
Standard – PAS 2050:2011 and CFP-PCR for Infrastructure-Bridge

查證準則：PAS 2050:2011、環保署核准(May 30, 2014) 基礎設施-橋梁產品類別規則(13-025)第1.0版

## Project description: 改善工程介紹

### 1. Project introduction: 改善工程介紹

#### 六、西濱快速公路曾文溪橋段新建規劃



西濱快速公路八棟寮至九塊厝段主線新建工程：西濱快速公路縣道176至縣道173段，長約10.4公里(含台17及縣道173路口改善)，路寬22.8公尺。

### 2. Functional unit: 功能單位

The appropriate functional unit is driven by how the infrastructure is typically consumed. The functional unit of infrastructure is defined as the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo.

### 3. Content of material and chemical substances: 原料組成

The main materials of **infrastructure** are shown as reinforced and concrete.

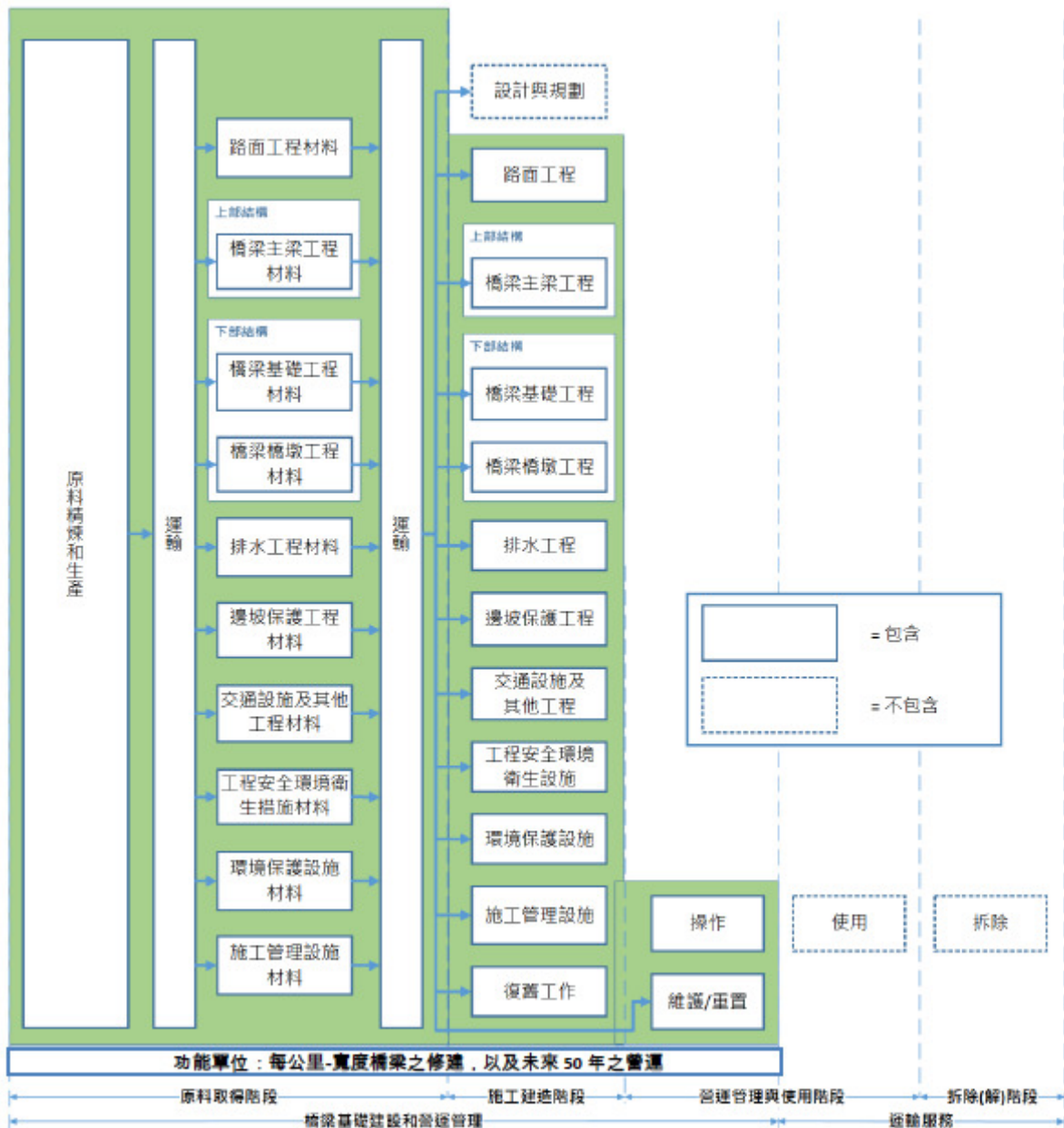
## System boundary: 系統邊界

### 1. System boundary: 產品系統界限

The system boundary for functional unit is cradle to grave, it includes life cycle stages carbon footprint such as raw material acquisition (including transportation), construction of infrastructure and operation of infrastructure phases.

系統界限為搖籃到墳墓，即包括了鑑別所有生命週期階段碳足跡如原料取得、工程建造及營運等階段。

## 2. Process map



## 3. Sources of GHG emission related to this infrastructure: 相關排放源

All installations relate to the infrastructure are covered in the verification, and the main emissions are from:

- Energy use (including energy sources, such as electricity)
- Combustion processes
- Chemical reactions
- Refrigerant loss and other fugitive gases
- Operations
- Transportation of raw material
- Land use change, not applicable for this infrastructure
- Livestock and other agricultural processes, not applicable for this infrastructure
- waste

## 4. Unit of analysis: 分析單元



Where a material is commonly available on a variable unit size basis, the calculation of GHG emissions shall be proportional to the unit size (e.g. per kilogram or per liter of goods sold, or per month or year of a service provided) 此工程碳足跡分析依此每一功能單位為分析單元

5. Material contribution and threshold: 實質貢獻與門閥

All sources of emissions anticipated to make a material contribution to the life cycle GHG emissions of the functional. At least 95% of the anticipated life cycle GHG emissions of the functional unit. In this assessment does not exclude any item so far. 本次評估目前為止未排除任何項目。

6. The availability of supplemental requirement or PCR (Infrastructure Category Rules) Relevant PCRs are progressing.

7. Data quality

(1) The Company provided data on:

- Distances from agents or suppliers of ingredients to the Company factory,
- Quantities and types of ingredients for the manufacturing of the infrastructure,
- Quantity and type of energy consumed of finished infrastructure produced,
- Quantity and type of materials used in packaging the finished infrastructure,
- Quantity and type of waste arising from manufacture and its treatment,
- Quantity and type of energy consumed in the use phase for the infrastructure.
- Distance and loads of wasted infrastructure.

已提供相關數據如供應商運送產品至工地之運輸距離、工程組成成份之投入量與種類、能源使用量、包材原料與相關工程廢棄物資訊等。

(2) Selection of the quantification methodologies: 量化方法的選擇

The organization has selected and used the combination of calculation based on infrastructure life cycle GHG activities primary data multiplied by related GHG emission factor/mass balance approach and measurement. Also, the emission factors from the LCA database software **Gabi 6.5.1.12 (DB version 6.110)** are applied as for most secondary data sources in its CFP report.

該組織已盤查產品生命週期初級活動數據，並乘以LCA資料庫軟體與本產品有關的排放係數後之結果詳列於其工程碳足跡盤查清冊。

The factors which used in this analysis are disclosed in its CFP inventory list; please refer to the details for factor digital numbers which are disclosed in its CFP inventory list. 現階段排放係數如產品碳足跡盤查清冊。

8. Allocation Rule:

Allocation between different infrasturcturs shall be based on mass, if applicable.

如適用時，分配規則以盤查期間各有關工程之物理關係為分配基礎。

The period of the life cycle GHG emission assertion for the first year: 第一年盤查期間

As described in its CFP report as from **January 31, 2012 to December 2014.**

**2.4 Commentary 觀察事項(將於Stage 1時再進一步確認)**

2012 to 2013

Ref.	Description
	Following observations raised form this document review should be considered as the opportunities for further improvement, and BSI will further check the relevant issues on site

Ref.	Description
OBS-SK1	2013年清冊中有部分數據與平台中資料不一致，第一階段時將於現場釐清： (1) WH77-A 標竹節鋼筋、用電 (2) WH77-B 標用電 (3) WH77-B 標平台工料編號MA-C-21-1 至 MA-C-21-5
OBS-CL02	請協助提供WH77-C標混凝土單位轉換M <sup>3</sup> →kg之係數

Please clear the findings of DR during Stage 1 verification.  
請於Stage 1查證時，就文件審查發現事項進行澄清。

2014

Ref.	Description
	Following observations raised form this document review should be considered as the opportunities for further improvement, and BSI will further check the relevant issues on site
NA	

Please clear the findings of DR during Stage 1 verification.  
請於Stage 1查證時，就文件審查發現事項進行澄清。

## 2.5 Notices to Client (NTCs) Identified(待修正事項)

2012 to 2013

Area	CARs Ref.	Description	Clause
N/A			

Please clear the findings of DR during Stage 1 verification.  
請於Stage 1查證時，就文件審查發現事項進行澄清。

2014

Area	CARs Ref.	Description	Clause
N/A			

Please clear the findings of DR during Stage 1 verification.  
請於Stage 1查證時，就文件審查發現事項進行澄清。

## 2.6 Stage1 Visit Plan (Prepared in accordance with ISO14065: 2007)

According to this desk review result, we prepare the stage 1 verification plan as following:  
根據本次文件審查結果，BSI盤查小組規劃後續查驗行程如後：

The detail plan please refer to the attachment of S1 verification plan  
詳細之查證規劃請參考第一階段的查證計畫

### 三、 Stage 1 Initial Verification

#### 第一階段首次(Year 2012-2013)查證

##### 3.1 Conclusion 結論

As a result of BSI infrastructure carbon footprint verification process, the following conclusions were drawn:

1. The outstanding issues have been identified as NTCs table.
2. The commentary issues have been identified as OBS table.
3. No opinion statement can be issued until the stage 2 verification

No material discrepancy in the infrastructure carbon footprint calculation for the “the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo “were revealed.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011.

During the verification 0 “notes to client (NTCs)” with 3 observation (OBS) were identified. NTCs shall be confirmed at stage 2.

本次查證共計發現0項改善事項及3項觀察事項。

This is subject to the submission of a satisfactory plan for investigating the identified NTCs and implementing effective corrective actions.

進行下階段查證前須提交計劃以調查不符合項，並實施有效的矯正措施。

Part of infrastructure carbon footprint inventory data and information management system for priod from 2012 to 2013 have been verified in accordance with PAS 2050:2011 requirements.

被查證單位的公共工程碳足跡盤查數據與資訊管理系統已遵循行PAS 2050:2011要求完成2012-2013年第一階段查證。

##### 3.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Coco Lin 林文華 Verifier: Stanley Kuo 郭郁中	The principal staff involved on behalf of the company were: Ms. 王惠玉/Ms.張貴鳳/Mr.蕭國文/Mr.陳韋綸/Ms.鄭淑珍/Mr.周武雄/Mr.許珮蓀/Mr.吳文彰/Mr.林彥宇
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##### 3.3 Stage1 Initial Verification Plan (Prepared in accordance with ISO19011:2002/14064-3: 2006) 第一階段查證計畫

Please refer to the attachment of S1 verification plan for details, the sampling plan is according to BSI PCF pilot scheme manual:

詳細之查證規劃請參考附件第一階段查證計畫，本階段數據抽樣原則依BSI PCF 技術手冊內容進行。

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
Suppliers	Raw Materials	75%	65%	50%
	Energy	75%	65%	50%

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
	Energy	75%	65%	50%
Own operation	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
	Energy	75%	65%	50%
Distribution	Transportation	75%	65%	50%
Consumer Use	Energy/ Resources	75%	65%	50%
Disposal	Transportation	75%	65%	50%
Secondary data – including factor source	LCA database/Quotation documents	75%	65%	50%

### 3.4 Infrastructure life cycle carbon footprint Inventory Summary 產品生命週期碳足跡盤查彙整

The PCF report is closed as NTC from DR, the revised system boundary is relation to activity, material, energy, transportation and waste.

The infrastructure life cycle carbon footprint inventory reports states the emissions as the following, and they are required to be revised. The GHG emissions of infrastructure will revise in accordance with result of NTC correction.

功能單位	排放量 tonne CO2-e
the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo	Need to confirm in April

Due to errors were found on this infrastructure life cycle GHG emissions, modifications of the above data are required and the emissions will be corrected on updated inventory report.

### 3.5 Summary of findings from these investigations

#### Verification Activities

The overall aim of verification is to review impartially and objectively the reported GHG emissions/ assertion under the agreement with the scope and reasonable assurance with the client.

The infrastructure carbon footprint assertion of the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo for **the period from 2012 to 2013 of construction progressing** has included the necessary items required in accordance with PAS 2050:2011, including description of the infrastructure, inventory data, covered reporting period, infrastructure system boundary, etc. Also, additional useful information is available in the assertion, including construction progressing and quantity of emissions etc.

This quantification methodology takes into account of monitoring method and reliability of emission data as well as the precision of measurement equipment applied.

Sinotech has established a good system and platform for data collection, therefore the data management system is good for data quality.  
The findings from Document Review has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NA			

### 3.6 Commentary 評論

<i>Nc Ref.</i>	<i>Description</i>
	Following observations raised from this assessment should be considered as the opportunities for further improvement:
OBS-SK1	請再釐清WH-77A標清冊中部分引用運輸係數，並請再評估係數彙整表中各規格運輸係數的合理性： 1. 43噸全拖車為0.0471 kg CO <sub>2</sub> e/tkm，但運輸用係數參照表中40噸以上為0.0512 kg CO <sub>2</sub> e/tkm (ME-巨蟹-挖土機01、02) 2. 35噸大貨車為0.0598 kg CO <sub>2</sub> e/tkm，但運輸用係數參照表中34-40噸為0.0471 kg CO <sub>2</sub> e/tkm (ME-奇鴻-打樁機、ME-巨蟹-壓路機)
OBS-CL01	預力端錨及續接器之單位重量轉換係數待確認。
OBS-CL02	1. 工程處辦公室緊急發電機與監理站分配方法及計算方法待確認。 2. 二段辦公室機車汽油用量尚未登錄使用量。

### 3.7 Notes To Client(NTCs) in this stage 本階段不符合事項

<i>Area</i> 區域	<i>NTC Ref.</i> 不符合項參考號	<i>Description</i> 描述	<i>Clause</i> 條款
NA			

(Tab in final cell for additional rows)

### 3.8 Recommendations 建議

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. Progress has been established towards PCFV the year 2014 stage 1 in next year.
3. The organization plans to continue to make necessary corrective and preventive action for outstanding issue and to update source list / report in accordance with inventory before stage 2 verification.

### 3.9 Further comments

BSI PCFV team suggests two ways in which the organization could further manage on its infrastructure life cycle Greenhouse Gas Emissions Inventory data:

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. It is beneficial for the client to quantify its uncertainty of GHG inventory to meet potential intended users in the future.

## 第一階段第二年度(Year 2014)查證

### 3.1 Conclusion 結論

As a result of BSI infrastructure carbon footprint verification process, the following conclusions were drawn:

1. The outstanding issues have been identified as NTCs table.
2. The commentary issues have been identified as OBS table.
3. No opinion statement can be issued until the stage 2 verification

No material discrepancy in the infrastructure carbon footprint calculation for the “the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo “were revealed.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011.

During the verification 4 “notes to client (NTCs)” with 3 observation (OBS) were identified. NTCs shall be confirmed at stage 2.

本次查證共計發現4項改善事項及3項觀察事項。

This is subject to the submission of a satisfactory plan for investigating the identified NTCs and implementing effective corrective actions.

進行下階段查證前須提交計劃以調查不符合項，並實施有效的矯正措施。

Part of infrastructure carbon footprint inventory data and information management system for period from 2012 to 2013 have been verified in accordance with PAS 2050:2011 requirements. 被查證單位的公共工程碳足跡盤查數據與資訊管理系統已遵循行PAS 2050:2011要求完成2014年第一階段查證。

### 3.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Coco Lin 林文華 Verifier: Stanley Kuo 郭郁中 Ivan Cheng 鄭仲凱	The principal staff involved on behalf of the company were: Ms. 王惠玉/Ms.張貴鳳/Mr.蕭國文/Mr.陳韋 綸/Ms.鄭淑珍/Mr.周武雄/Mr.許珮蓀/Mr.吳 文彰/Mr.林彥宇
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### 3.3 Stage1 Initial Verification Plan (Prepared in accordance with ISO19011:2002/14064-3: 2006) 第一階段查證計畫

Please refer to the attachment of S1 verification plan for details, the sampling plan is according to BSI PCF pilot scheme manual:

詳細之查證規劃請參考附件第一階段查證計畫，本階段數據抽樣原則依BSI PCF 技術手冊內容進行。

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
Suppliers	Raw Materials	75%	65%	50%
	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Own operation	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Distribution	Transportation	75%	65%	50%
Consumer Use	Energy/ Resources	75%	65%	50%
Disposal	Transportation	75%	65%	50%
Secondary data – including factor source	LCA database/Quotation documents	75%	65%	50%

### 3.4 Infrastructure life cycle carbon footprint Inventory Summary 產品生命週期碳足跡盤查彙整

The PCF report is closed as NTC from DR, the revised system boundary is relation to activity, material, energy, transportation and waste.

The infrasturcture life cycle carbon footprint inventory reports states the emissions as the following, and they are required to be revised.

功能單位	排放量 tonne CO2-e
the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo	Need to confirm at the time of completion

Due to errors were found on this infrastructure life cycle GHG emissions, modifications of the above data are required and the emissions will be corrected on updated inventory report.

### 3.5 Summary of findings from these investigations

#### Verification Activities

The overall aim of verification is to review impartially and objectively the reported GHG emissions/ assertion under the agreement with the scope and reasonable assurance with the client.

The infrastructure carbon footprint assertion of the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo for **the 2014 of construction progressing** has included the necessary items required in accordance with PAS 2050:2011, including description of the infrastructure, inventory data, covered reporting period, infrastructure system boundary, etc. Also, additional useful information is available in the assertion, including construction progressing and quantity of emissions etc.

This quantification methodology takes into account of monitoring method and reliability of emission data as well as the precision of measurement equipment applied.

Sinotech has established a good system and platform for data collection, therefore the data management system is good for data quality.

The findings from Document Review has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NA			

### 3.6 Commentary 評論

<i>Nc Ref.</i>	<i>Description</i>
	Following observations raised from this assessment should be considered as the opportunities for further improvement:
OBS-CL01	鋼筋外包彎軋加工有二種方式，一為鋼筋廠直接送至加工廠，一為先送至工地在運送至加工廠，應預防重複登錄或漏登錄之發生。
OBS-SK01	請再提供A標化學錨筋(19mm & 36 mm) 兩種規格的單位重量轉換計算佐證資料。
OBS-IC01	請再釐清剪力鋼箱所引用排放係數數值之正確性。

### 3.7 Notes To Client(NTCs) in this stage 本階段不符合事項

<i>Area</i> 區域	<i>NTC Ref.</i> 不符合項參考號	<i>Description</i> 描述	<i>Clause</i> 條款
WH77-C 標	NTC-CL01	以下各項遺漏登錄或盤查數據與佐證資料不一致： 1. 遺漏登錄： (1) 石膏粉 (2) 洋釘 (3) 不織布 (4) 木板、木片 2. 盤查數據與佐證資料不一致： (1) 剪力鋼箱 (2) 鋼筋 (3) 混凝土	7.2
A標 PCF Inventory	NTC-SK01	抽樣發現103年度盤查清冊中有部分活動數據與佐證資料有不一致的情形： 1. 材料編號MA-H-05竹節鋼筋SD420W，於清冊中的活動數據與估驗計價資料及發貨單不一致。 2. 材料編號MA-H-09 PVC管涵，清冊中的活動數據與2014.12.12送貨單的數量不一致。 3. 第二工務段(安南)兩電號於計價期間103.10.01-103.11.30的用電量有誤植。	7.2
B標工程	NTC-IC01	下列原物料未納入碳足跡盤查項目， (1) 護坡工程投入之竹節鋼筋材料(SD280W)。 (2) 護坡工程投入之聚氣乙烯止水帶。	6.4
B標工程	NTC-IC02	下列活動數據需修正， (1) 剪力鋼箱(800T)依估驗計價表之投入數量為14組，與盤查清冊數值(10組)不一致。 (2) MA-A-焊條-頤達(永大興)依系統資料之投入數量為6,900kg，與盤查清冊數值(4,500kg)不一致。 (3) MA-A-焊條-頤達依系統資料之投入數量為1,150kg，與盤查清冊數值(600kg)不一致。	7.3



(Tab in final cell for additional rows)

The findings from Document Review has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NTC-CL01	<p>以下各項遺漏登錄或盤查數據與佐證資料不一致：</p> <p>3. 遺漏登錄：            (5) 石膏粉            (6) 洋釘            (7) 不織布            (8) 木板、木片</p> <p>4. 盤查數據與佐證資料不一致：            (4) 剪力鋼箱            (5) 鋼筋            (6) 混凝土</p>	<p>1. 石膏粉、洋釘、不織布、補縫木片等工料之進貨追蹤：石膏粉、洋釘、不織布之103年度進料單，已要求承包商蒐集並補登錄於盤查系統，並洽詢供應商提供單位進貨量(每包、每箱、每網...)之重量資料。另補縫木片係隨木模板材角材所附帶之零星工料，出貨單不會註明數量，無法記錄。</p> <p>2. 剪力鋼箱、鋼筋、混凝土等工料，已要求承包商依每月實際計價統計資料(佐證資料)，重新修改103年度盤查系統填報資料；並要求承包商自104年起，鋼筋及混凝土運入數量資料，除依供應商出貨單逐筆填報之外，同時應定期依實際計價統計資料再進行每月總量之檢核。</p> <p>此外，鋼筋計價統計資料所列为純鋼筋重量，不含續接器，已依訂貨單及供應商提供資料進行重量估算，並補填於盤查系統。</p>	closed
NTC-SK0 1	<p>抽樣發現103年度盤查清冊中有部分活動數據與佐證資料有不一致的情形：</p> <p>1. 材料編號MA-H-05竹節鋼筋SD420W，於清冊中的活動數據與估驗計價資料及發貨單不一致。</p> <p>2. 材料編號MA-H-09 PVC管涵，清冊中的活動數據與2014.12.12送貨單的數量不一致。</p> <p>3. 第二工務段(安南)兩電號於計價期間 103.10.01-103.11.30的用電量有誤植。</p>	<p>1. 經與承包商確認，MA-H-05竹節鋼筋用量經數量變更後，102年度計價數量由14噸減為9噸，103年度則無計價數量。</p> <p>2. 清冊數據係為誤植，已修正。</p> <p>3. 兩電號用電量為相互誤植，已修正。</p>	colsed
NTC-IC01	<p>下列原物料未納入碳足跡盤查項目，</p> <p>(1) 護坡工程投入之竹節鋼筋材料(SD280W)。</p> <p>(2) 護坡工程投入之聚氣乙烯止水帶。</p>	<p>已將護坡工程之竹節鋼筋及止水帶納入清冊計算</p>	closed

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NTC-IC02	<p>下列活動數據需修正，</p> <p>(4) 剪力鋼箱(800T)依估驗計價表之投入數量為14組，與盤查清冊數值(10組)不一致。</p> <p>(5) MA-A-焊條-頤達(永大興)依系統資料之投入數量為6,900kg，與盤查清冊數值(4,500kg)不一致。</p> <p>(6) MA-A-焊條-頤達依系統資料之投入數量為1,150kg，與盤查清冊數值(600kg)不一致。</p>	<p>剪力鋼箱、焊條使用數量經與承包商確認後，已將清冊修正完成。</p>	closed

### 3.8 Recommendations 建議

4. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
5. Progress has been established towards PCFV the year 2015 stage 1 in next year.
6. The organization plans to continue to make necessary corrective and preventive action for outstanding issue and to update source list / report in accordance with inventory before stage 2 verification.

### 3.9 Further comments

BSI PCFV team suggests two ways in which the organization could further manage on its infrastructure life cycle Greenhouse Gas Emissions Inventory data:

3. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
4. It is beneficial for the client to quantify its uncertainty of GHG inventory to meet potential intended users in the future.

## 第一階段第三年度(Year 2015)查證 for WH77-A標工程

### 3.1 Conclusion 結論

As a result of BSI infrastructure carbon footprint verification process, the following conclusions were drawn:

4. The outstanding issues have been identified as NTCs table.
5. The commentary issues have been identified as OBS table.
6. No opinion statement can be issued until the stage 2 verification

No material discrepancy in the infrastructure carbon footprint calculation for the “the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo **Section A**” were revealed.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011.

During the verification 3 “notes to client (NTCs)” with 2 observation (OBS) were identified. NTCs shall be confirmed at stage 2.

本次查證共計發現3項改善事項及2項觀察事項。

This is subject to the submission of a satisfactory plan for investigating the identified NTCs and implementing effective corrective actions.

進行下階段查證前須提交計劃以調查不符合項，並實施有效的矯正措施。

Part of infrastructure carbon footprint inventory data and information management system for period from 2015 have been verified in accordance with PAS 2050:2011 requirements.

被查證單位的公共工程碳足跡盤查數據與資訊管理系統已遵循行PAS 2050:2011要求完成2015年第一階段查證。

### 3.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Ivan Cheng 鄭仲凱 Verifier: Stanley Kuo 郭郁中 Coco Lin 林文華	The principal staff involved on behalf of the company were: Mr.周武雄/Ms.許珮蓀/Mr.林彥宇
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### 3.3 Stage1 Initial Verification Plan (Prepared in accordance with ISO19011:2002/14064-3: 2006) 第一階段查證計畫

Please refer to the attachment of S1 verification plan for details, the sampling plan is according to BSI PCF pilot scheme manual:

詳細之查證規劃請參考附件第一階段查證計畫，本階段數據抽樣原則依BSI PCF 技術手冊內容進行。

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
Suppliers	Raw Materials	75%	65%	50%
	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
	Waste Treatment (include water waste)	75%	65%	50%
Own operation	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Distribution	Transportation	75%	65%	50%
Consumer Use	Energy/ Resources	75%	65%	50%
Disposal	Transportation	75%	65%	50%
Secondary data – including factor source	LCA database/Quotation documents	75%	65%	50%

### 3.4 Infrastructure life cycle carbon footprint Inventory Summary 產品生命週期碳足跡盤查彙整

The PCF report is closed as NTC from DR, the revised system boundary is relation to activity, material, energy, transportation and waste.

The infrasturcture life cycle carbon footprint inventory reports states the emissions as the following, and they are required to be revised.

功能單位	排放量 tonne CO2-e
the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo	Need to confirm at the time of completion

Due to errors were found on this infrastructure life cycle GHG emissions, modifications of the above data are required and the emissions will be corrected on updated inventory report.

### 3.5 Summary of findings from these investigations

#### Verification Activities

The overall aim of verification is to review impartially and objectively the reported GHG emissions/ assertion under the agreement with the scope and reasonable assurance with the client.

The infrastructure carbon footprint assertion of the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo for **the 2014 of construction progressing** has included the necessary items required in accordance with PAS 2050:2011, including description of the infrastructure, inventory data, covered reporting period, infrastructure system boundary, etc. Also, additional useful information is available in the assertion, including construction progressing and quantity of emissions etc.

This quantification methodology takes into account of monitoring method and reliability of emission data as well as the precision of measurement equipment applied.

Sinotech has established a good system and platform for data collection, therefore the data management system is good for data quality.

The findings from Document Review has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NA			

### 3.6 Commentary 評論

<i>Nc Ref.</i>	<i>Description</i>
	Following observations raised form this assessment should be considered as the opportunities for further improvement:
OBS-IC01	下列物料請確認是否須納入碳足跡盤查項目， (1)高架橋下部結構工程投入之填縫劑(甲.B.25)。 (2)高架橋下部結構工程之排水器(甲.B.26)。
OBS-CL01	101年1~11月先行施工估算之機具施工時數，清冊與系統資料不一致，係因查證後，仍有數據修正，為同步修正清冊，惟因排放量佔比僅佔全部排放量0.79%，但其他標工程有類似情形發生時，請務必同步修正相關清冊與系統登錄資料。

### 3.7 Notes To Client(NTCs) in this stage 本階段不符合事項

<i>Area</i> 區域	<i>NTC Ref.</i> 不符合項參考號	<i>Description</i> 描述	<i>Clause</i> 條款
WH77-A 標 PCF Inventory	NTC-IC01	下列活動數據與佐證資料不一致， (3) 橋面版工程投入之預力鋼腱(MA-A-05), 材料運輸活動數據與盤查清冊(855.396 ton)不一致。 (4) 橋面版工程投入之隔護欄伸縮縫(MA-A-18-1 & MA-A-19-1), 104.2.16資料有誤植之狀況。 (5) 橋面版工程投入之MA-橋面伸縮縫保麗龍, 實際活動數據應為16片, 盤查清冊為8片。 (6) 護欄工程投入之金屬橋欄杆底座(MA-A-22-1), 其單片重量應為12kg, 與盤查清冊14.5kg不一致。 (7) 橋面版工程投入之MA-黏油(鴻林), 數據統計計量單位有不一致的狀況(104.1.15以kg計量, 其餘為桶數)。 (8) 橋面版工程投入之臨時鋼質支撐架基座處理(材料)(MA-A30), 材料運輸活動數據與盤查清冊(102.785 ton)不一致。 (9) 基礎橋墩工程與基樁工程投入之竹節鋼筋(MA-B-07), 材料運輸活動數據與盤查清冊(9,283.06 ton)不一致。	7.3
WH77-A 標 PCF Inventory	NTC-SK01	清冊中, 部分排放源活動數據與系統資料有不一致的情形: 1. MA-F-03碎石 (清冊中為7148 M <sup>3</sup> , 但系統中為4027.6 M <sup>3</sup> ) 2. MA-I-02海雀稗(草毯) (清冊中為30419 M <sup>2</sup> , 但系統中佐證單據加總為28600 M <sup>2</sup> ) 3. 瀝青透層(MA-F-4)、瀝青黏層(MA-F-5、MA-M-5)的佐證資料未能於系統中查到。	7.3
施工機具	NTC-CL01	102及103年機具施工有漏登或登錄之情形。	7.2

(Tab in final cell for additional rows)

### **3.8 Recommendations 建議**

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. Progress has been established towards PCFV the year 2015 stage 1 in next year.
3. The organization plans to continue to make necessary corrective and preventive action for outstanding issue and to update source list / report in accordance with inventory before stage 2 verification.

### **3.9 Further comments**

N/A

## 第一階段第三年度(Year 2015)查證 for WH77-B & WH77-C標工程

### 3.1 Conclusion 結論

As a result of BSI infrastructure carbon footprint verification process, the following conclusions were drawn:

7. The outstanding issues have been identified as NTCs table.
8. The commentary issues have been identified as OBS table.
9. No opinion statement can be issued until the stage 2 verification

No material discrepancy in the infrastructure carbon footprint calculation for the “the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo Section B & C” were revealed.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011.

During the verification 3 “notes to client (NTCs)” with 3 observation (OBS) were identified. NTCs shall be confirmed at stage 2.

本次查證共計發現3項改善事項及3項觀察事項。

This is subject to the submission of a satisfactory plan for investigating the identified NTCs and implementing effective corrective actions.

進行下階段查證前須提交計劃以調查不符合項，並實施有效的矯正措施。

Part of infrastructure carbon footprint inventory data and information management system for period from 2015 have been verified in accordance with PAS 2050:2011 requirements.

被查證單位的公共工程碳足跡盤查數據與資訊管理系統已遵循行PAS 2050:2011要求完成2015年第一階段查證。

### 3.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Ivan Cheng 鄭仲凱 Verifier: Jason Cheng 鄭宗雄	The principal staff involved on behalf of the company were: Mr.周武雄/Ms.許珮蓓/Mr.林彥宇
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### 3.3 Stage1 Initial Verification Plan (Prepared in accordance with ISO19011:2002/14064-3: 2006) 第一階段查證計畫

Please refer to the attachment of S1 verification plan for details, the sampling plan is according to BSI PCF pilot scheme manual:

詳細之查證規劃請參考附件第一階段查證計畫，本階段數據抽樣原則依BSI PCF 技術手冊內容進行。

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
Suppliers	Raw Materials	75%	65%	50%
	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
	Waste Treatment (include water waste)	75%	65%	50%
Own operation	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Distribution	Transportation	75%	65%	50%
Consumer Use	Energy/ Resources	75%	65%	50%
Disposal	Transportation	75%	65%	50%
Secondary data – including factor source	LCA database/Quotation documents	75%	65%	50%

### 3.4 Infrastructure life cycle carbon footprint Inventory Summary 產品生命週期碳足跡盤查彙整

The PCF report is closed as NTC from DR, the revised system boundary is relation to activity, material, energy, transportation and waste.

The infrasturcture life cycle carbon footprint inventory reports states the emissions as the following, and they are required to be revised.

功能單位	排放量 tonne CO2-e
the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo	Need to confirm at the time of completion

Due to errors were found on this infrastructure life cycle GHG emissions, modifications of the above data are required and the emissions will be corrected on updated inventory report.

### 3.5 Summary of findings from these investigations

#### Verification Activities

The overall aim of verification is to review impartially and objectively the reported GHG emissions/ assertion under the agreement with the scope and reasonable assurance with the client.

The infrastructure carbon footprint assertion of the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo for **the 2015 of construction progressing** has included the necessary items required in accordance with PAS 2050:2011, including description of the infrastructure, inventory data, covered reporting period, infrastructure system boundary, etc. Also, additional useful information is available in the assertion, including construction progressing and quantity of emissions etc.

This quantification methodology takes into account of monitoring method and reliability of emission data as well as the precision of measurement equipment applied.

Sinotech has established a good system and platform for data collection, therefore the data management system is good for data quality.



The findings from Document Review has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NA			

### 3.6 Commentary 評論

<i>Nc Ref.</i>	<i>Description</i>
	Following observations raised from this assessment should be considered as the opportunities for further improvement:
OBS-IC01	下列物料請確認是否須納入碳足跡盤查項目, (1)預埋PCV管(100mm) § A管(甲.A.32)。 (2)不銹鋼踏步19mm § (甲.A.36)。 (3)螺栓式燈柱基礎螺栓及接地(甲.L.2)。
OBS-IC02	請釐清下列項目, (1)C標MA-0214預力套管單位重量。 (2)請確認B標盤式支承之規格與供應商提供資料名稱之一致性,包括盤式支承,雙向活動型(700tf/800tf/1500tf/1700tf)。
OBS-JC01	(西濱南WH77-C標1)鉅榮鋼筋場因使用至2015年8月份即撤場,清冊用電量活動數據亦僅統計至8月份止,但施工碳足跡盤查資訊管理系統仍將9月份後之用電量鍵入,且於清冊中之4-1表中仍備註說明將繼續收集未來一年之福利社用電量數據,以年平均用電量予以扣除,請考量將上述兩項資訊修正,以避免造成誤解。

### 3.7 Notes To Client(NTCs) in this stage 本階段不符合事項

<i>Area</i> 區域	<i>NTC Ref.</i> 不符合項參考號	<i>Description</i> 描述	<i>Clause</i> 條款
WH77-B 標 PCF Inventory	NTC-IC01	下列活動數據與佐證資料不一致, (1) MA-A-焊條(春原)系統上為425kg,與盤查清冊100kg不一致。 (2) MA-A-焊條(隆續)材料使用為330 Kg,系統上未有活動數據佐證文件。 (3) MA-B-06結構用混凝土,系統上材料使用顯示為889m3,與材料運輸880m3有不一致的狀況。 (4) 系統上顯示MA-無收縮水泥用量為180包,MA-無收縮水泥砂漿為625包,與清冊625包有不一致的狀況。 (5) MA-A-漆料系統上為267加侖,與盤查清冊259加侖不一致。 (6) MA-A-松香水系統上為63加侖,與盤查清冊59加侖不一致。 (7) MA-A-乙炔系統上為570支,與盤查清冊304.5支不一致。 (8) MA-A-氧氣系統上為927支,與盤查清冊500支不一致。 (9) ME-安傑-共用油箱-92汽油系統上為1,079.87公升,與盤查清冊 639.13 公升不一致。	7.3
排放係數	NTC-IC02	下列排放係數須更新, (1) MA-A-水泥為I型水泥,目前引用II型水泥排放係數。 (2) MA-A-18鍍鋅套管之排放係數未更新(Air ventilation duct-zinc coated steel plate)。	7.4

Area 區域	NTC Ref. 不符合項參考號	Description 描述	Clause 條款
		(3) MA-A-24橋面排水管材質與排放係數材質不一致。 (4) 鋼材(Steel Sheet, BF route)未更新至最新係數。 (5) MA-無收縮水泥砂漿排放係數與材質(太空包PE)不一致。	
WH77-C 標 PCF Inventory	NTC-JC01	西濱南WH77-C標1)部分排放項目未完整鑑別，如下所述： (1)焊條 (2)油漆	6.3.5

(Tab in final cell for additional rows)

The findings from Stage-1 Verification has been assessed in this verification, the result is as follows:

CARs Ref.	Description	Corrective Actions	Follow up
NTC-IC01	下列活動數據與佐證資料不一致， (1) MA-A-焊條(春原)系統上為425kg，與盤查清冊100kg不一致。 (2) MA-A-焊條(隆續)材料使用為330 Kg，系統上未有活動數據佐證文件。 (3) MA-B-06結構用混凝土，系統上材料使用顯示為889m3，與材料運輸880m3有不一致的狀況。 (4) 系統上顯示MA-無收縮水泥用量為180包，MA-無收縮水泥砂漿為625包，與清冊625包有不一致的狀況。 (5) MA-A-漆料系統上為267加侖，與盤查清冊259加侖不一致。 (6) MA-A-松香水系統上為63加侖，與盤查清冊59加侖不一致。 (7) MA-A-乙炔系統上為570支，與盤查清冊304.5支不一致。 (8) MA-A-氧氣系統上為927支，與盤查清冊500支不一致。 (9) ME-安傑-共用油箱-92汽油系統上為1,079.87公升，與盤查清冊 639.13 公升不一致。	已修正焊條、無收縮水泥砂漿、漆料、松香水、乙炔、氧氣數量。 已補充焊條(隆續)之進料佐證文件。 已修正安傑共用油箱之數量。	closed
NTC-IC02	下列排放係數須更新， (1) MA-A-水泥為I型水泥，目前引用II型水泥排放係數。 (2) MA-A-18鍍鋅套管之排放係數未更新 (Air ventilation duct-zinc coated steel plate)。 (3) MA-A-24橋面排水管材質與排放係數材質不一致。 (4) 鋼材(Steel Sheet, BF route)未更新至最新係數。 (5) MA-無收縮水泥砂漿排放係數與材質(太空包PE)不一致。	I型水泥之係數將引用本計畫水泥供應商盤查所得之”I型與其他型”水泥碳足跡係數。 已更新鍍鋅套管、鋼材之排放係數。 已修正水泥砂漿排放係數。	colsed

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NTC-JC01	西濱南WH77-C標1)部分排放項目未完整鑑別，如下所述： (1)焊條 (2)油漆	WH77-C標已將焊條及尤其納入修正盤查清冊。	closed

### **3.8 Recommendations 建議**

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. Progress has been established towards PCFV the year 2016 stage 1 in next year.
3. The organization plans to continue to make necessary corrective and preventive action for outstanding issue and to update source list / report in accordance with inventory before stage 2 verification.

### **3.9 Further comments**

N/A

## 第一階段第三年度(Year 2016)查證 for WH77-B & WH77-C標工程

### 3.1 Conclusion 結論

As a result of BSI infrastructure carbon footprint verification process, the following conclusions were drawn:

10. The outstanding issues have been identified as NTCs table.
11. The commentary issues have been identified as OBS table.
12. No opinion statement can be issued until the stage 2 verification

No material discrepancy in the infrastructure carbon footprint calculation for the “the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo Section B & C” were revealed.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011.

During the verification 3 “notes to client (NTCs)” with 1 observation (OBS) were identified. NTCs shall be confirmed at stage 2.

本次查證共計發現3項改善事項及1項觀察事項。

This is subject to the submission of a satisfactory plan for investigating the identified NTCs and implementing effective corrective actions.

進行下階段查證前須提交計劃以調查不符合項，並實施有效的矯正措施。

Part of infrastructure carbon footprint inventory data and information management system for period from 2015 have been verified in accordance with PAS 2050:2011 requirements.

被查證單位的公共工程碳足跡盤查數據與資訊管理系統已遵循行PAS 2050:2011要求完成2015年第一階段查證。

### 3.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Ivan Cheng 鄭仲凱 Verifier: Chuan Liu 劉謹銓	The principal staff involved on behalf of the company were: Mr.周武雄/Ms.許珮蓂/Mr.林彥宇 Ms.王寧沂/Ms.
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### 3.3 Stage1 Initial Verification Plan (Prepared in accordance with ISO19011:2002/14064-3: 2006) 第一階段查證計畫

Please refer to the attachment of S1 verification plan for details, the sampling plan is according to BSI PCF pilot scheme manual:

詳細之查證規劃請參考附件第一階段查證計畫，本階段數據抽樣原則依BSI PCF 技術手冊內容進行。

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
Suppliers	Raw Materials	75%	65%	50%
	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Own operation	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Distribution	Transportation	75%	65%	50%
Consumer Use	Energy/ Resources	75%	65%	50%
Disposal	Transportation	75%	65%	50%
Secondary data – including factor source	LCA database/Quotation documents	75%	65%	50%

### 3.4 Infrastructure life cycle carbon footprint Inventory Summary 產品生命週期碳足跡盤查彙整

The PCF report is closed as NTC from DR, the revised system boundary is relation to activity, material, energy, transportation and waste.

The infrasturcture life cycle carbon footprint inventory reports states the emissions as the following, and they are required to be revised.

功能單位	排放量 tonne CO2-e
the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo	Need to confirm at the time of completion

Due to errors were found on this infrastructure life cycle GHG emissions, modifications of the above data are required and the emissions will be corrected on updated inventory report.

### 3.5 Summary of findings from these investigations

#### Verification Activities

The overall aim of verification is to review impartially and objectively the reported GHG emissions/ assertion under the agreement with the scope and reasonable assurance with the client.

The infrastructure carbon footprint assertion of the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo for **the 2016 of construction progressing** has included the necessary items required in accordance with PAS 2050:2011, including description of the infrastructure, inventory data, covered reporting period, infrastructure system boundary, etc. Also, additional useful information is available in the assertion, including construction progressing and quantity of emissions etc.

This quantification methodology takes into account of monitoring method and reliability of emission data as well as the precision of measurement equipment applied.

Sinotech has established a good system and platform for data collection, therefore the data management system is good for data quality.

The findings from Document Review has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
NA			

### 3.6 Commentary 評論

<i>Nc Ref.</i>	<i>Description</i>
	Following observations raised form this assessment should be considered as the opportunities for further improvement:
OBS-CL01	經抽查之活動數據有部分錯誤或遺漏，請再進一步確認或修正： 1. 12/13之多孔隙瀝青323.85 kg(已扣除退運)，登為密級配瀝青，請確認。 2. 機具能資源使用中，於泛亞油罐車加油紀錄3/30有一筆加於信越高空車之63公升，請確認。
OBS-IC01	請確認 1) B標志一企業竹節鋼筋引用宜聯鋼筋排放係數之合理性。 2) C標再生瀝青混凝土排放係數沿用粗級配瀝青混凝土排放係數之合理性。

### 3.7 Notes To Client(NTCs) in this stage 本階段不符合事項

<i>Area</i> 區域	<i>NTC Ref.</i> 不符合項參考號	<i>Description</i> 描述	<i>Clause</i> 條款
WH77-B 標 PCF Inventory	NTC-IC01	(1) MA-A-07 & MA-A-08於2016/08/31資料有重複計算運輸重量 (2) 橋面版懸臂及橋面板拱橋，其鋼筋材料編號與系統呈現不一致，包括MA-B-08 & MA-B-09應改為MA-A-08 & MA-A-09 (3) MA-A-33瀝青混凝土依實際單據顯示用量為3096.42 ton, 與盤查清冊3088 ton不一致 (4) MA-A-34黏油依實際單據顯示用量為6335 L, 與盤查清冊6173 L不一致	7.3
WH77-B 標 PCF Inventory	NTC-IC02	(1) MA-A-26 結構用混凝土(245kg/cm <sup>2</sup> )重量轉換引用錯誤(420kg/cm <sup>2</sup> )規格 (2) MA-B-04-官田混凝土(210kgf/cm <sup>2</sup> , II型水泥)重量轉換引用錯誤(280kg/cm <sup>2</sup> )規格 (3) MA-H-03-官田混凝土(245kgf/cm <sup>2</sup> , II型水泥)重量轉換引用錯誤(140kg/cm <sup>2</sup> )規格 (4) MA-R-06--5-官田混凝土(水中210kgf/cm <sup>2</sup> , II型水泥)重量轉換引用錯誤(140kg/cm <sup>2</sup> )規格 (5) 混凝土排放係數未依最新盤查結果更新 (6) 漢泰竹節鋼筋(SD 280W & SD 420W)排放係數與C標引用數值不一致	7.4

Area 區域	NTC Ref. 不符合項參考號	Description 描述	Clause 條款
WH77-C 標 PCF Inventory	NTC-IC03	(1) MA-0277, MA-0278 & MA-0279鍍鋅隔柵蓋板及框座應使用Steel hot dip galvanized, blast furnace route之係數 (2) MA-A-26-2金屬橋欄杆基座應使用Steel hot dip galvanized, blast furnace route之係數 (3) MA-0299鋁板應使用Steel hot dip galvanized, blast furnace route之係數	7.4

(Tab in final cell for additional rows)

The findings from Stage-1 Verification has been assessed in this verification, the result is as follows:

CARs Ref.	Description	Corrective Actions	Follow up
NTC-IC01	(1) MA-A-07 & MA-A-08於2016/08/31資料有重複計算運輸重量 (2) 橋面版懸臂及橋面板拱橋, 其鋼筋材料編號與系統呈現不一致, 包括MA-B-08 & MA-B-09應改為MA-A-08 & MA-A-09 (3) MA-A-33瀝青混凝土依實際單據顯示用量為3096.42 ton, 與盤查清冊3088 ton不一致 (4) MA-A-34黏油依實際單據顯示用量為6335 L, 與盤查清冊6173 L不一致	(1) 已修正重複計算運輸項目。 (2) 已修正材料編碼為MA-A-08 & MA-A-09。 (3) 已修正MA-A-33瀝青混凝土用量為3,096.42 ton。 (4) 已修正MA-A-34黏油依實際單據顯示用量為6,335 L。	Closed
NTC-IC02	(1) MA-A-26 結構用混凝土(245kg/cm <sup>2</sup> )重量轉換引用錯誤(420kg/cm <sup>2</sup> )規格 (2) MA-B-04-官田混凝土(210kgf/cm <sup>2</sup> , II型水泥)重量轉換引用錯誤(280kg/cm <sup>2</sup> )規格 (3) MA-H-03-官田混凝土(245kgf/cm <sup>2</sup> , II型水泥)重量轉換引用錯誤(140kg/cm <sup>2</sup> )規格 (4) MA-R-06--5-官田混凝土(水中210kgf/cm <sup>2</sup> , II型水泥)重量轉換引用錯誤(140kg/cm <sup>2</sup> )規格 (5) 混凝土排放係數未依最新盤查結果更新 (6) 漢泰竹節鋼筋(SD 280W & SD 420W)排放係數與C標引用數值不一致	(1)~(4) 已修正混凝土轉換重量。 (5) 已更新混凝土排放係數。 (6) 已修正漢泰鋼筋排放係數。	Closed
NTC-IC03	(1) MA-0277, MA-0278 & MA-0279鍍鋅隔柵蓋板及框座應使用Steel hot dip galvanized, blast furnace route之係數 (2) MA-A-26-2金屬橋欄杆基座應使用Steel hot dip galvanized, blast furnace route之係數 (3) MA-0299鋁板應使用Steel hot dip galvanized, blast furnace route之係數	已修正鍍鋅隔柵蓋板、金屬橋欄杆基座及鋁板之排放係數。	Closed

### **3.8 Recommendations 建議**

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. Progress has been established towards PCFV the year 2017 stage 1 in next year.
3. The organization plans to continue to make necessary corrective and preventive action for outstanding issue and to update source list / report in accordance with inventory before stage 2 verification.

### **3.9 Further comments**

N/A



## 第一階段第五年度(Year 2017)查證 for WH77-C標工程

### 3.1 Conclusion 結論

As a result of BSI infrastructure carbon footprint verification process, the following conclusions were drawn:

13. The outstanding issues have been identified as NTCs table.
14. The commentary issues have been identified as OBS table.
15. No opinion statement can be issued until the stage 2 verification

No material discrepancy in the infrastructure carbon footprint calculation for the “the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo **Section C**” were revealed.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011.

During the verification 2 “notes to client (NTCs)” with 2 observation (OBS) were identified. NTCs shall be confirmed at stage 2.

本次查證共計發現 2 項改善事項及 2 項觀察事項。

This is subject to the submission of a satisfactory plan for investigating the identified NTCs and implementing effective corrective actions.

進行下階段查證前須提交計劃以調查不符合項，並實施有效的矯正措施。

Part of infrastructure carbon footprint inventory data and information management system for period from 2015 have been verified in accordance with PAS 2050:2011 requirements.

被查證單位的公共工程碳足跡盤查數據與資訊管理系統已遵循行 PAS 2050:2011 要求完成 2015 年第一階段查證。

### 3.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Ivan Cheng 鄭仲凱 Verifier: Stanley Kuo 郭郁中	The principal staff involved on behalf of the company were: Mr.周武雄/Ms.許珮蓓/Ms.王寧沂
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### 3.3 Stage1 Initial Verification Plan (Prepared in accordance with ISO19011:2002/14064-3: 2006) 第一階段查證計畫

Please refer to the attachment of S1 verification plan for details, the sampling plan is according to BSI PCF pilot scheme manual:

詳細之查證規劃請參考附件第一階段查證計畫，本階段數據抽樣原則依 BSI PCF 技術手冊內容進行。

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
Suppliers	Raw Materials	75%	65%	50%
	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water	75%	65%	50%

Source /Verification Area	Process	Sampling size (min)		
		H	M	L
	waste)			
Own operation	Energy	75%	65%	50%
	Other emission sources	75%	65%	50%
	Transportation	75%	65%	50%
	Waste Treatment (include water waste)	75%	65%	50%
Distribution	Transportation	75%	65%	50%
Consumer Use	Energy/ Resources	75%	65%	50%
Disposal	Transportation	75%	65%	50%
Secondary data – including factor source	LCA database/Quotation documents	75%	65%	50%

### 3.4 Infrastructure life cycle carbon footprint Inventory Summary 產品生命週期碳足跡盤查彙整

The PCF report is closed as NTC from DR, the revised system boundary is relation to activity, material, energy, transportation and waste.

The infrastructure life cycle carbon footprint inventory reports states the emissions as the following, and they are required to be revised.

功能單位	排放量 tonne CO2-e
the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo	<b>Need to confirm at the time of completion</b>

Due to errors were found on this infrastructure life cycle GHG emissions, modifications of the above data are required and the emissions will be corrected on updated inventory report.

### 3.5 Summary of findings from these investigations

#### Verification Activities

The overall aim of verification is to review impartially and objectively the reported GHG emissions/ assertion under the agreement with the scope and reasonable assurance with the client.

The infrastructure carbon footprint assertion of the New Infrastructure of West Coast Expressway from Badunliao to Jiukuaicuo for **the 2017 of construction progressing** has included the necessary items required in accordance with PAS 2050:2011, including description of the infrastructure, inventory data, covered reporting period, infrastructure system boundary, etc. Also, additional useful information is available in the assertion, including construction progressing and quantity of emissions etc.

This quantification methodology takes into account of monitoring method and reliability of emission data as well as the precision of measurement equipment applied.

Sinotech has established a good system and platform for data collection, therefore the data management system is good for data quality.

The findings from Document Review has been assessed in this verification, the result is as follows:

CARs Ref.	Description	Corrective Actions	Follow up
NA			

### 3.6 Commentary 評論

Nc Ref.	Description
	Following observations raised from this assessment should be considered as the opportunities for further improvement:
OBS-SK01	1. 西濱南工處及第三工務段排放清冊中，部分年度的冷媒活動數據可能因excel公式設定有誤而無法顯示，請再確認。 2. 系統上 1-1 機具使用部分項目，未納入1-2 機具運輸項目，如: 泛亞-53-推土機(外租)、泛亞-51-土車(外租)、泛亞-50-山貓(外租)，請再釐清此情形。
OBS-IC01	請確認綠石組成中膠泥引用PVC係數之合理性

### 3.7 Notes To Client(NTCs) in this stage 本階段不符合事項

Area 區域	NTC Ref. 不符合項參考號	Description 描述	Clause 條款
盤查清冊	NTC-IC01	甲.A.10-甲.A.15 XLPE(PVC)被覆電力電纜活動數據與排放係數單位不一致	7.3
盤查清冊	NTC-IC02	下列排放係數請再確認， (1)210 II水泥(安定)排放係數應為254.455(kg CO <sub>2</sub> e/m <sup>3</sup> ) (2)鋼筋續接器使用PE(Steel Rebar, GLO)之一致性 (3)PVC管件管帽應使用PE(polyvinylchloride pipe(PVC))之排放係數 (4)H型鋼應使用PE(Steel sheet, BF route)排放係數 (5)電力排放係數應考量更新，最新排放係數為0.654kg/kwh	7.4
n.a			

(Tab in final cell for additional rows)

The findings from Stage-1 Verification has been assessed in this verification, the result is as follows:

CARs Ref.	Description	Corrective Actions	Follow up
NTC-IC01	甲.A.10-甲.A.15 XLPE(PVC)被覆電力電纜活動數據與排放係數單位不一致	已修正電纜活動數據之單位為公尺(m)，與排放係數單位一致kgCO <sub>2</sub> e/m	Closed
NTC-IC02	下列排放係數請再確認， (1)210 II水泥(安定)排放係數應為254.455(kg CO <sub>2</sub> e/m <sup>3</sup> ) (2)鋼筋續接器使用PE(Steel Rebar, GLO)之一致性 (3)PVC管件管帽應使用PE(polyvinylchloride pipe(PVC))之排放係數 (4)H型鋼應使用PE(Steel sheet, BF route)排放係數	(1) 已修正210 II水泥(安定)排放係數為254.55 kg CO <sub>2</sub> e/m <sup>3</sup> (2) 已修正鋼筋續接排放係數 (3) 已修正PVC管件管帽係數 (4) 已修正H型鋼排放係數 (5) 已修正工區場電及辦公室用電之排放係數為	Closed

<i>CARs Ref.</i>	<i>Description</i>	<i>Corrective Actions</i>	<i>Follow up</i>
	(5)電力排放係數應考量更新, 最新排放係數為0.654kg/kwh	0.654 kg/kwh	

### **3.8 Recommendations 建議**

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. The organization plans to continue to make necessary corrective and preventive action for outstanding issue and to update source list / report in accordance with inventory before stage 2 verification.

### **3.9 Further comments**

N/A

## 四、 Stage 2 Initial Verification 第二階段首次查證

### 第二階段首次查證 for WH77-A標工程(Y2015)

#### 4.1 Conclusion 結論

After completing BSI infrastructure life cycle GHG emissions verification procedures, the following conclusions were drawn:

1. The corrective and preventive actions for outstanding issues are accepted.
2. Data quality was considered acceptable in meeting the principles as set out in PAS 2050:2011.
3. The level of assurance for the infrastructure life cycle GHG emission inventory report is reasonable.

We are pleased to announce that the result of verification detailed in this report is Unqualified Opinion (無保留意見). It meets the relative specification and the GHG-related information disclose sufficient and appropriate.

As a result of carrying out verification procedures, BSI verification team will recommend to issue the verification statements as below:

As a result of carrying out the verification of infrastructure cycle greenhouse gas emissions, it is the opinion of BSI with **reasonable** assurance that:

- **The infrastructure carbon footprint with the declaration unit of Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- A (297K+300~298K+613) Yan Cheng Interchange Project (西濱快速公路八棟寮至九塊厝 WH77-A 標鹽埕交流道新建工程) is 71,453.53 tonnes of CO<sub>2</sub> equivalent.**
- **No material misstatements in this infrastructure life cycle greenhouse gas emission assertion were revealed.**

The product life cycle GHG data quality was verified to be acceptable against the requirements of **PAS 2050:2011**.

This statement shall be valid for a maximum period of **two years** after the latest issue date on this certificate. Should there be a change in the life cycle of the product whose GHG emissions are being assessed, the validity of this opinion statement will cease.

The related information is as follows:

- System boundary for this infrastructure : **Cradle to Grave**  
The infrastructure system boundary is consistent with its system boundary definition in PCF report for infrastructure carbon footprint, which involves the acquisition of raw material, construction activities, transportation, use, disposal and treatment in the infrastructure life cycle.
- The data in this infrastructure life cycle greenhouse gas inventory report was from **31 January, 2012 to 10 May, 2015**.
- The primary activity data include related construction activities from its own processes under the operational control of the organization, and partial supplier including -HAI KWANG ENTERPRISE CORPORATION (海光企業股份有限公司)
- The secondary data include relative factors from public sources and LCA software **Gabi 6.5.1.12**.
- **The infrastructure carbon footprint with the functional unit of per kilometer (in width from 11.4~23.56 meters) of Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- A (297K+300~298K+613) Yan Cheng Interchange Project Mainline (西濱快速公路八棟寮至九塊厝 WH77-A 標鹽埕交流道新建工程主線) is 23,582.48 tonnes of**

- CO<sub>2</sub> equivalent.
- The infrastructure carbon footprint with the functional unit of per kilometer (in width of 7.5 meters) of Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- A (297K+300~298K+613) Yan Cheng Interchange Project Ramp (西濱快速公路八棟寮至九塊厝 WH77-A 標鹽埕交流道新建工程匝道) is 14,002.18 tonnes of CO<sub>2</sub> equivalent.

Originally registered:

Latest Issue

Expired by: dd/02/2018

#### 4.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Ivan Cheng	The principal staff involved on behalf of the company were: Mr.周武雄/Mr.許珮蓊/Mr.林彥宇
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#### 4.3 Stage2 Initial Verification Plan 第二階段查證計畫(Prepared in accordance with ISO19011: 2002/14064-3: 2006)

PCFV Stage 2 Verification is 1 man day (on site 1 verification day) 第二階段查證預計執行 1 人天  
The detail plan please refer to the attachment of S2 verification plan  
詳細之查證規劃請參考第二階段的查證計畫

Date 日期	Time 時間	Assessor 稽核員	Area 稽核內容	Clause(s) 條文
December 3 & 4, 2015	09:00-09:30	BSI Team	起始會議 Opening Meeting	
	09:30-15:00	Team A	產品碳足跡盤查報告書及清冊 (含 NTC 結案)	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary 系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of product 產品碳足跡計算
	15:00-16:00	BSI Team	稽核小組討論和準備報告 Assessor Review and Report Preparation	
	16:00-16:30	BSI Team	結束會議 Closing Meeting	
	12:00-13:00		Lunch 午餐	

#### 4.4 Inventory Summary 盤查彙整

The content in this inventory was prepared based on its Inventory list and PCF report (dated December 12, 2015) for PAS 2050:2011; therefore it is also consistent to its two PCF reports. The product life cycle GHG emissions are as the following, and they are validated as correct.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011；數據品質符PAS 2050:2011要求.

The product carbon footprint in different life cycle stages in accordance to PAS 2050:2011, their emission distributions are as follows:

產品名	排放量 Tonnes CO <sub>2</sub> -e
Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- A (297K+300~298K+613) Yan Cheng Interchange Project (西濱快速公路八棟寮至九塊厝WH77-A標鹽埕交流道新建工程)	<b>71,453.53</b>

表 3.4.1-1 WH77-A 標碳足跡彙整與一級數據比例分析

類別		總量	一級	二級
原物料	項目	-	鋼筋(鋼胚/鋼筋製程)、 - 混凝土製程	其他工程材料
	排碳量	60,889.79	11,754.76	49,115.03
	占比	85.23%	16.45%	68.78%
運輸	項目	-	竹節鋼筋、 - 預拌混凝土運輸	其他工程材料與機具運輸
	排碳量	1,711.18	1,152.75	558.43
	占比	2.39%	1.61%	0.78%
施工階段 (工區)	項目	-	常駐工區機具之汽/柴油及 - 電力消耗	非常駐工區機具之操作時 數轉換耗能；人員逸散
	排碳量	1,732.99	1,621.59	111.41
	占比	2.43%	2.27%	0.16%
施工階段 (管理)	項目	-	辦公室用電、用水、公務車 - 用油	天然氣、冷媒及人員逸散
	排碳量	366.25	323.79	42.46
	占比	0.51%	0.45%	0.06%
廢棄物	項目	-	-	工區廢棄物及承包商、主管 - 機關、監造生活廢棄物
	排碳量	54.84	-	54.84
	占比	0.08%	-	0.08%
營運管理階 段	項目	-	-	養護工程材料、機具耗能 - 與營運期間照明耗能
	排碳量	6,888.48	-	6,888.48
	占比	9.36%	-	9.36%
<b>宣告單位總計 (tonCO<sub>2</sub>e)</b>		<b>71,453.53</b>	<b>14,852.88</b> <b>20.79%</b>	<b>56,600.63</b> <b>79.21%</b>

## 4.5 Summary of findings from these investigations

A correction plan for the findings of site visit was submitted to BSI for review and had been accepted.

The materiality assessment and strategic review documents were updated during the verification to take into account of sufficient evidence provided by the client.

## 4.6 Commentary 評論

<i>Nc Ref.</i>	Description
	Following observations raised from this assessment should be considered as the opportunities for further improvement:
N/A	

## 4.7 Notes To Client(NTCs) in this stage 本階段不符合事項

Area 區域	NTC Ref. 不符合項參考號	Description 描述	Clause 條款
N/A			

(Tab in final cell for additional rows)

## 4.7 The Follow-up of Notes To Customer(NTCs) 不符合項追蹤說明

(Y2014)

The findings from Stage-1 Verification has been assessed in this verification, the result is as follows:

<i>CARs Ref.</i>	Description	Corrective Actions	Follow up
NTC-CL01	<p>以下各項遺漏登錄或盤查數據與佐證資料不一致：</p> <ol style="list-style-type: none"> <li>遺漏登錄：               <ol style="list-style-type: none"> <li>石膏粉</li> <li>洋釘</li> <li>不織布</li> <li>木板、木片</li> </ol> </li> <li>盤查數據與佐證資料不一致：               <ol style="list-style-type: none"> <li>剪力鋼箱</li> <li>鋼筋</li> <li>混凝土</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>石膏粉、洋釘、不織布、補縫木片等工料之進貨追蹤：石膏粉、洋釘、不織布之103年度進料單，已要求承包商蒐集並補登錄於盤查系統，並洽詢供應商提供單位進貨量(每包、每箱、每網…)之重量資料。另補縫木片係隨木模板材角材所附帶之零星工料，出貨單不會註明數量，無法記錄。</li> <li>剪力鋼箱、鋼筋、混凝土等工料，已要求承包商依每月實際計價統計資料(佐證資料)，重新修改103年度盤查系統填報資料；並要求承包商自104年起，鋼筋及混凝土運入數量資料，除依供應商出貨單逐筆填報之外，同時應定期依實際計價統計資料再進行每月總量之檢核。</li> </ol> <p>此外，鋼筋計價統計資料所列為純鋼筋重量，不含續接器，已依訂貨單及供應商提供資料進行重量估算，並補填於盤查系統。</p>	closed



CARs Ref.	Description	Corrective Actions	Follow up
NTC-SK0 1	<p>抽樣發現103年度盤查清冊中有部分活動數據與佐證資料有不一致的情形:</p> <p>4. 材料編號MA-H-05竹節鋼筋SD420W, 於清冊中的活動數據與估驗計價資料及發貨單不一致。</p> <p>5. 材料編號MA-H-09 PVC管涵, 清冊中的活動數據與2014.12.12送貨單的數量不一致。</p> <p>6. 第二工務段(安南)兩電號於計價期間 103.10.01-103.11.30的用電量有誤植。</p>	<p>1.經與承包商確認, MA-H-05竹節鋼筋用量經數量變更後,102年度計價數量由14噸減為9噸, 103年度則無計價數量。</p> <p>2.清冊數據係為誤植, 已修正。</p> <p>3.兩電號用電量為相互誤植, 已修正。</p>	colosed
NTC-IC01	<p>下列原物料未納入碳足跡盤查項目,</p> <p>(3) 護坡工程投入之竹節鋼筋材料(SD280W)。</p> <p>(4) 護坡工程投入之聚氯乙烯止水帶。</p>	已將護坡工程之竹節鋼筋及止水帶納入清冊計算	closed
NTC-IC02	<p>下列活動數據需修正,</p> <p>(1) 剪力鋼箱(800T)依估驗計價表之投入數量為14組, 與盤查清冊數值(10組)不一致。</p> <p>(2) MA-A-焊條-頤達(永大興)依系統資料之投入數量為6,900kg, 與盤查清冊數值(4,500kg)不一致。</p> <p>(3) MA-A-焊條-頤達依系統資料之投入數量為1,150kg, 與盤查清冊數值(600kg)不一致。</p>	剪力鋼箱、焊條使用數量經與承包商確認後, 已將清冊修正完成。	closed

#### Y2015

CARs Ref.	Description	Corrective Actions	Follow up
NTC-IC01	<p>下列活動數據與佐證資料不一致,</p> <p>(1) 橋面版工程投入之預力鋼腱(MA-A-05), 材料運輸活動數據與盤查清冊(855.396 ton)不一致。</p> <p>(2) 橋面版工程投入之隔護欄伸縮縫(MA-A-18-1 &amp; MA-A-19-1), 104.2.16資料有誤植之狀況。</p> <p>(3) 橋面版工程投入之MA-橋面伸縮縫保麗龍, 實際活動數據應為16片, 盤查清冊為8片。</p> <p>(4) 護欄工程投入之金屬橋欄杆底座(MA-A-22-1), 其單片重量應為12kg, 與盤查清冊14.5kg不一致。</p> <p>(5) 橋面版工程投入之MA-黏油(鴻林), 數據統</p>	活動數據已修正	Closed

	<p>計量單位有不一致的狀況(104.1.15以kg計量,其餘為桶數)。</p> <p>(6) 橋面版工程投入之臨時鋼質支撐架基座處理(材料)(MA-A30),材料運輸活動數據與盤查清冊(102.785 ton)不一致。</p> <p>(7) 基礎橋墩工程與基樁工程投入之竹節鋼筋(MA-B-07),材料運輸活動數據與盤查清冊(9,283.06 ton)不一致。</p>		
NTC-SK01	<p>清冊中,部分排放源活動數據與系統資料有不一致的情形:</p> <ol style="list-style-type: none"> <li>1. MA-F-03碎石(清冊中為7148 M<sup>3</sup>,但系統中為4027.6 M<sup>3</sup>)</li> <li>2. MA-I-02海雀稗(草毯)(清冊中為30419 M<sup>2</sup>,但系統中佐證單據加總為28600 M<sup>2</sup>)</li> <li>3. 瀝青透層(MA-F-4)、瀝青黏層(MA-F-5、MA-M-5)的佐證資料未能於系統中查到。</li> </ol>	活動數據已修正	Closed
NTC-CL01	102及103年機具施工有漏登或登錄之情形。	活動數據已修正	Closed

(Tab in final cell for additional rows)

#### 4.8 Recommendations 建議

1. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
2. It is beneficial for the client to quantify its uncertainty of GHG inventory to meet potential intended users in the future.

#### 4.9 Further comments

N/A

## 第二階段首次查證 for WH77-C標工程(Y2017)

### 4.1 Conclusion 結論

After completing BSI infrastructure life cycle GHG emissions verification procedures, the following conclusions were drawn:

4. The corrective and preventive actions for outstanding issues are accepted.
5. Data quality was considered acceptable in meeting the principles as set out in PAS 2050:2011.
6. The level of assurance for the infrastructure life cycle GHG emission inventory report is reasonable.

We are pleased to announce that the result of verification detailed in this report is Unqualified Opinion (無保留意見). It meets the relative specification and the GHG-related information disclose sufficient and appropriate.

As a result of carrying out verification procedures, BSI verification team will recommend to issue the verification statements as below:

As a result of carrying out the verification of infrastructure cycle greenhouse gas emissions, it is the opinion of BSI with **reasonable** assurance that:

- **The infrastructure carbon footprint with the declaration unit of Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- C (302K+225~305K+750) Jiu Kuai Chuo Interchange Project (西濱快速公路八棟寮至九塊厝 WH77-C 標九塊厝交流道新建工程) is 116,844.12 tonnes of CO<sub>2</sub> equivalent.**
- **No material misstatements in this infrastructure life cycle greenhouse gas emission assertion were revealed.**

The product life cycle GHG data quality was verified to be acceptable against the requirements of **PAS 2050:2011**.

This statement shall be valid for a maximum period of **two years** after the latest issue date on this certificate. Should there be a change in the life cycle of the product whose GHG emissions are being assessed, the validity of this opinion statement will cease.

The related information is as follows:

- System boundary for this infrastructure : **Cradle to Grave**  
The infrastructure system boundary is consistent with its system boundary definition in PCF report for infrastructure carbon footprint, which involves the acquisition of raw material, construction activities, transportation, use, disposal and treatment in the infrastructure life cycle.
- The data in this infrastructure life cycle greenhouse gas inventory report was from **2013-09-12 to 2017-03-10**.
- The primary activity data include related construction activities from its own processes under the operational control of the organization, and partial supplier including  
-Taiwan Cement Corporation (台灣水泥股份有限公司)  
-HUNG JUNG INDUSTRY COM. LTD (宏業實業股份有限公司)  
-**Kuncing Asphalt Industry Co. Ltd (坤慶瀝青工業股份有限公司)**  
-TUNG HO STEEL ENTERPRISE CORP. (東和鋼鐵企業股份有限公司)
- The secondary data include relative factors from public sources and LCA software **Gabi 6.5.1.12**.
- **The infrastructure carbon footprint with the functional unit of per kilometer (in width from 11.4~44.5 meters) of Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- C (302K+225~305K+750) Jiu Kuai Chuo Interchange Project Mainline**

(西濱快速公路八棟寮至九塊厝 WH77-C 標九塊厝交流道新建工程主線) is 36,571.99 tonnes of CO<sub>2</sub> equivalent.

- The infrastructure carbon footprint with the functional unit of per kilometer (in width of 7.5 meters) of Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- C (302K+225~305K+750) Jiu Kuai Chuo Interchange Project Ramp (西濱快速公路八棟寮至九塊厝 WH77-C 標九塊厝交流道新建工程匝道) is 15,296.11 tonnes of CO<sub>2</sub> equivalent.

Originally registered:

Latest Issue

Expired by: dd/02/2019

#### 4.2 Verification Team 查證小組

On behalf of BSI the verification was conducted by: Lead Verifier: Ivan Cheng	The principal staff involved on behalf of the company were: Mr.周武雄/Mr.許珮蒨/Ms.王寧沂
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#### 4.3 Stage2 Initial Verification Plan 第二階段查證計畫(Prepared in accordance with ISO19011: 2002/14064-3: 2006)

PCFV Stage 2 Verification is 1 man day (on site 1 verification day) 第二階段查證預計執行 1 人天  
The detail plan please refer to the attachment of S2 verification plan  
詳細之查證規劃請參考第二階段的查證計畫

Date 日期	Time 時間	Assessor 稽核員	Area 稽核內容	Clause(s) 條文
August 25, 2017	09:00 - 09:30	BSI Team	起始會議 Opening Meeting	
	09:30 - 15:00	Team A	產品碳足跡盤查報告書及清冊 (含 NTC 結案)	PAS 2050:2011 4. Principles and implementation 原則及實施 5. Emissions and removals 排放源及移除源 6. System Boundary 系統邊界 7. Data 數據 8. Allocation of emission 排放量分配 9. Calculation of GHG emissions of product 產品碳足跡計算
	15:00 - 16:00	BSI Team	稽核小組討論和準備報告 Assessor Review and Report Preparation	
	16:00 - 16:30	BSI Team	結束會議 Closing Meeting	
	12:00 - 13:00		Lunch 午餐	

#### 4.4 Inventory Summary 盤查彙整

The content in this inventory was prepared based on its Inventory list and PCF report (dated October 10, 2017) for PAS 2050:2011; therefore it is also consistent to its two PCF reports. The product life cycle GHG emissions are as the following, and they are validated as correct.

Data quality was considered acceptable in accordance with the principles as set out in PAS 2050:2011；數據品質符PAS 2050:2011要求.

The product carbon footprint in different life cycle stages in accordance to PAS 2050:2011, their emission distributions are as follows:

產品名	排放量 Tonnes CO <sub>2</sub> -e
Taiwan West Coast Expressway Ba Dong Liao to Jiu Kuai Chuo Section WH77- C (302K+225~305K+750) Jiu Kuai Chuo Interchange Project (西濱快速公路八棟寮至九塊厝WH77-C標九塊厝交流道新建工程)	116,844.12

表 3.4.1-1 WH77-C 標碳足跡彙整與一級數據比例分析

類別		總量	一級數據	二級數據	
工程材料	工程材料使用	項目	- 鋼筋、混凝土及瀝青製程	其他工程材料	
		排碳量	103,104.16	57,162.01	45,942.15
		占比	88.24%	48.92%	39.32%
運輸	工程材料與機具運輸	項目	- 預拌混凝土運輸	其他工程材料與機具運輸	
		排碳量	3,165.78	2,467.68	698.10
		占比	2.71%	2.11%	0.60%
施工階段	工區 (機具使用)	項目	- 常駐工區機具之汽/柴油及電力消耗	非常駐工區機具之操作時數轉換耗能；人員逸散	
		排碳量	2,922.61	2,587.81	334.80
		占比	2.50%	2.21%	0.29%
	管理單位	項目	- 辦公室用電、用水、公務車用油	天然氣、主管機關、監造生活廢棄物、冷媒及人員逸散	
		排碳量	839.33	751.00	88.33
		占比	0.72%	0.64%	0.08%
	廢棄物及人員逸散	項目	-	- 工區廢棄物及人員逸散	
		排碳量	166.89	-	166.89
		占比	0.14%	-	0.14%
營運管理	營運管理及使用階段	項目	-	維護/重置工程材料、機具耗能與營運期間照明耗能	
		排碳量	6,645.36	-	6,645.36
		占比	5.69%	-	5.69%
<b>宣告單位總計(tonCO<sub>2</sub>e)</b>		<b><u>116,844.12</u></b>	<b><u>62,968.50</u></b>	<b><u>53,875.63</u></b>	
			<b><u>53.89%</u></b>	<b><u>46.11%</u></b>	
<b>宣告單位總計 (不含生質, tonCO<sub>2</sub>e)</b>			<b><u>116,808.61</u></b>		

表 3.4.2-1 WH77-C 標各功能單位排放量彙整表

項目		主線	匝道	合計
排碳量 (ton CO <sub>2</sub> e)	基樁	26,150.81	1,329.17	27,479.99
	基礎	13,782.21	469.05	14,251.26
	橋墩	6,579.80	238.29	6,818.09
	上構	44,339.08	1,281.38	45,620.46
	其他	22,045.81	628.50	22,674.31
	小計	112,897.73	3,946.40	116,844.12
長度(km)		3.087	0.258	-
平均寬度(m)		22.0* (寬度為 11.4~44.5)	7.5 (寬度為 7.5)	-
橋面版面積(m <sup>2</sup> )		67,873.71	1,935.00	-
功能單位	ton CO <sub>2</sub> e/km	36,571.99	15,296.11	-
排碳量	ton CO <sub>2</sub> e/km-m	1,663.35	2,039.48	-

\*平均寬度(m) = 橋面版面積(m<sup>2</sup>) / 長度(km) / 1000

#### 4.5 Summary of findings from these investigations

A correction plan for the findings of site visit was submitted to BSI for review and had been accepted.

The materiality assessment and strategic review documents were updated during the verification to take into account of sufficient evidence provided by the client.

#### 4.6 Commentary 評論

Nc Ref.	Description
	Following observations raised from this assessment should be considered as the opportunities for further improvement:
N/A	

#### 4.7 Notes To Client(NTCs) in this stage 本階段不符合事項

Area 區域	NTC Ref. 不符合項參考號	Description 描述	Clause 條款
N/A			

(Tab in final cell for additional rows)

#### 4.8 The Follow-up of Notes To Customer(NTCs) 不符合項追蹤說明

The findings from Stage-1 Verification has been assessed in this verification, the result is as follows:

CARs Ref.	Description	Corrective Actions	Follow up
n/a	請參考各階段S1報告		

#### **4.8 Recommendations 建議**

3. At this stage, the main recommendation is obviously to address the outstanding issues recorded in the table NTCs.
4. It is beneficial for the client to quantify its uncertainty of GHG inventory to meet potential intended users in the future.

#### **4.9 Further comments**

N/A



## 五、Processes/Business Areas verified 查證的流程/業務區域

Refer to assessment summary table for PAS 2050:2011.

		Business Area / Process				NTC
Requirement						0/15
4	Principles and implementation 原則與實施	*				
4.1	General requirement 一般要求	*				
4.2	Principles(relevance, completeness, consistency, accuracy, transparency)原則	*				
4.3	Supplementary requirement 補充要求	*				
4.4	Record-keeping 紀錄保存	*				
4.5	Implementation 實施運作	*				
5	Emissions and removals 排放量與移除量	*				
5.1	Scope of GHG emissions and removals GHG排放及移除範圍		*			
5.2	Time period for inclusion of GHG emissions and removals 納入GHG排放及移除量的評估期		*			
5.3	Global Warming Potential (GWP) 全球暖化潛勢		*			
5.4	Aircraft of GHG emissions and removals 航空GHG排放及移除		*			
5.5	Carbon storage in infrastructures 產品中的碳儲存					
5.6	Inclusion and treatment of land use change 土地使用變更的納入及處理		*			
5.7	Treatment of soil carbon change in existing systems 現有系統中土壤碳變化的處理		*			
5.8	Offsetting 抵換		*			
5.9	Unit of analysis 分析單元	*				
6	System boundary 系統邊界	*				
6.1	Establishing system boundary 系統邊界的建立	*				
6.2	Cradle-to-gate GHG emissions and removals assessment 搖籃到大門的GHG排放與移除	*				
6.3	Material contribution and threshold 實質貢獻及門檻	*				
6.4	Element of Infrastructure System 產品系統組成	*				
6.5	System boundary exclusions 系統邊界的排除	*				
7	Data 數據		*			
7.1	General 概述		*			
7.2	Data quality rules 數據品質規則		*			
7.3	Primary activity data 初級活動數據		*			
7.4	Secondary data 次級數據		*			
7.5	Changes in the life cycle of a infrastructure 產品生命週期的變化		*			
7.6	Variability in emissions and removals associated with the infrastructure life cycle 產品生命週期產生排放的可變性		*			
7.7	Data sampling 數據抽樣		*			
7.8	Non-CO2 emissions data for livestock and soils 牲畜和土壤的非CO2排放數據		*			
7.9	Emissions data for fuel, electricity and heat 燃料、電和熱排放數據		*			
7.10	The validity of analysis 分析的有效期		*			
8	Allocation of emissions 排放的分配		*			
8.1	General requirement 一般要求		*			
8.2	Emissions from waste 產生自廢棄物的排放		*			
8.3	Use of recycled material and recycling 再生材料的利用與回收		*			
8.4	Treatment of emissions associated with reuse 關於與再利用有關的排放的處理		*			
8.5	Emissions from energy infrastructure from CHP 能源產生的排放(汽電共生)		*			
8.6	Emission from transport 運輸的排放		*			
9	Calculation of the GHG emissions of infrastructures 產品溫室氣體排放的計算		*			
10	Claims of conformity 符合性聲明	*				

10.1	General						
10.2	Basis of claim						
10.3	Permitted forms of disclosure						
<b>Legend- Business Areas / Process Assessed</b>							
A	NTCs and corrective and preventive actions review as described in previous clauses.						
B	NTCs and corrective and preventive actions review as described in previous clauses						
Note							

### Verification Details 查證資料

SMO Number 報告號碼:	DR-8108517/8298356 8406400/8470224 8662312 S1-8108519/8108521 8281550/8281551 8406401/8467013 8521312/8521313 8662313/8662314 8778481 S2-8406402/8778482
Verification Start Date 查證開始日期:	DR-February 17, 21, 2014 March 8, 2015 October 24, 2015 February 4, 2016 January 26, 2017 S1-March 3-4, 2014 March 14, 2014 March 9-10, 2015 March 19, 2015 November 04, 2015 February 16-17, 2016 March 16, 2016 May 23 & 27, 2016 February 8-9, 2017 March 2, 2017 August 10-11, 2017 S2-December 03 & 04, 2015 August 25, 2017
Visit Type 查證種類:	PAS 2050:2011
Number of Man-day 總人天數:	DR-2+1+1+1+1 man day (off site) S1-6+10+ 6.5+9 man days (on site) S2-2+1 man days (on site)
Customer Service Officer <i>if known</i> 客戶服務專員:	Chien Yun (Nell) Wang

### Location Details 地點資料

<b>Mandatory (English)</b> 必選項(英文)	
BSI Reference BSI參考號	WEST C-0047461596-000
Company Name & Address 公司名稱及地址(商號)	West Coast Expressway Southern Region Temporary Engineering Office, Directorate General of Highways, Ministry of Transportation and Communications. 5F, No. 29, Puzi 7th Rd. Puzi City Chiayi County Taiwan
Contact Name 客戶聯絡姓名	林彥宇 博士
Telephone Number 客戶聯絡電話	+886-2-27698388
Fax Number	+886-2-87611589

客戶聯絡傳真	
e-mail Address 客戶聯絡電郵地址	<a href="mailto:yenyul@mail.sinotech.com.tw">yenyul@mail.sinotech.com.tw</a>
Best Fit Code – T Codes: 技術代碼	T03
Local Accreditation Coding Classification: 驗證範圍代碼表	
Best Fit Code – S Codes: 專業代碼	
Location Client Manager: 地點客戶經理	
<b>Optional (Chinese)</b> 可選項(中文)	
Company Name & Address 公司名稱及地址 (商號)	交通部公路總局西部濱海公路南區臨時工程處 臺灣嘉義縣朴子市朴子七路29號
Contact Name 客戶聯絡姓名	林彥宇 博士
Change to this section? 更改此部分	<input type="checkbox"/>
Comments or additional actions: 評語或額外行動	

### Billing Details 帳務資料

<b>Mandatory (English)</b> 必選項(英文)	
Company Name & Address 公司名稱及地址	West Coast Expressway Southern Region Temporary Engineering Office, Directorate General of Highways, Ministry of Transportation and Communications. 5F, No. 29, Puzi 7th Rd. Puzi City Chiayi County Taiwan
Billing Contact 聯絡人	林彥宇 博士
Billing Telephone Number 電話號碼	+886-2-27698388
Billing Fax Number 傳真號碼	+886-2-87611589
Billing E-mail 電郵地址	<a href="mailto:yenyul@mail.sinotech.com.tw">yenyul@mail.sinotech.com.tw</a>
<b>Optional (Chinese)</b> 可選項(中文)	
Company Name & Address 公司名稱及地址	交通部公路總局西部濱海公路南區臨時工程處 臺灣嘉義縣朴子市朴子七路29號
Billing Contact 聯絡人	林彥宇 博士
<b>Mandatory (English)</b> 必選項(英文)	
Change to this section? 更改此部分	<input type="checkbox"/>
Comments or additional actions: 評語或額外行動	

### Certification Details 證書資料

<b>Mandatory (English)</b> 必選項(英文)	
Certificate Number 證書號碼	CFPV 094-1~4
Certificate Issue Date 發證日期	N/A
Last Re-issue Date 最近一次發證日期	N/A
Expiry Date 有效日期	N/A
Accreditation Marks 認證標誌	
Best Fit Code – P Codes 產品代碼	
Co-ordinating Client Manager: 管理客戶經理	
Management Standard (i.e. ISO 9001:2000) 系統標準	PAS 2050:2011
Scope of Registration (as appears on Certificate) 認證範圍(於證書第一頁顯示)	
Location Activities 地點活動	
<b>Optional (Chinese)</b> 可選項(中文)	
Scope of Registration (as appears on Certificate) 認證範圍(於證書第一頁顯示)	
Location Activities 地點活動	
<b>Mandatory (English)</b> 必選項(英文)	
Change to this section? 更改此部分	<input type="checkbox"/>
Require to Issue/Reissue Cert.? 需要發證/重發證書	<input type="checkbox"/>
Reason (comments or additional actions) 原因(評語或額外行動)	

## Confirmation of Report Content 報告確認

The document review for the year 2016 of the New Infrastructure of the West Coast Expressway from Badunliao to Jiukuaicuo managed by West Coast Expressway Southern Region Temporary Engineering Office was completed.

本次對 貴組織所管理的西濱快速道路八棟寮至九塊厝所進行之文件審查業已完成。

Please sign below confirming acceptance of the Verification reports contents (Report number/s):  
請簽署確認同意報告(編號)中的內容:

**8662312**

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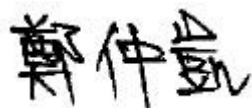
Signed for on behalf of BSI  
BSI 代表簽署

Signed for on behalf of the client  
客戶代表簽署

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Chung-Kai (Ivan) Cheng

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January 26, 2017

<b>Z</b>	<b>1</b>
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SMO	Functional Location	SAP Material
8662312	WEST C-0047461596-000	200594690

## Confirmation of Report Content 報告確認

The Stage-1 Verification for the year 2016 of the New Infrastructure of the West Coast Expressway from Badunliao to Jiukuaicuo managed by West Coast Expressway Southern Region Temporary Engineering Office was completed.

本次對 貴組織所管理的西濱快速道路八棟寮至九塊厝所進行之第一階段審查業已完成。

Please sign below confirming acceptance of the Verification reports contents (Report number/s):

請簽署確認同意報告(編號)中的內容:

**8662313**

---

Signed for on behalf of BSI

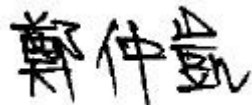
BSI 代表簽署

Signed for on behalf of the client

客戶代表簽署

Chung-Kai (Ivan) Cheng

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February 8-9, 2017

Z	1
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SMO	Functional Location	SAP Material
8662313	WEST C-0047461596-000	200594690

## Confirmation of Report Content 報告確認

The Stage-1 Verification for the year 2016 of the New Infrastructure of the West Coast Expressway from Badunliao to Jiukuaicuo managed by West Coast Expressway Southern Region Temporary Engineering Office was completed.

本次對 貴組織所管理的西濱快速道路八棟寮至九塊厝所進行之第一階段審查業已完成。

Please sign below confirming acceptance of the Verification reports contents (Report number/s):  
請簽署確認同意報告(編號)中的內容:

**8662314**

---

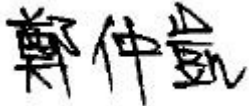
Signed for on behalf of BSI  
BSI 代表簽署

Signed for on behalf of the client  
客戶代表簽署

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Chung-Kai (Ivan) Cheng

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March 2, 2017

Z	1
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SMO	Functional Location	SAP Material
8662314	WEST C-0047461596-000	200594690



## Confirmation of Report Content 報告確認

The Stage-1 Verification for the year 2017 of the New Infrastructure of the West Coast Expressway from Badunliao to Jiukuaicuo managed by West Coast Expressway Southern Region Temporary Engineering Office was completed.

本次對 貴組織所管理的西濱快速道路八棟寮至九塊厝所進行之第一階段審查業已完成。

Please sign below confirming acceptance of the Verification reports contents (Report number/s):  
請簽署確認同意報告(編號)中的內容:

**8778481**

---

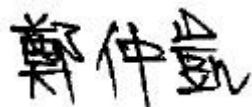
Signed for on behalf of BSI  
BSI 代表簽署

Signed for on behalf of the client  
客戶代表簽署

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Chung-Kai (Ivan) Cheng

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August 11, 2017

Z	1
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SMO	Functional Location	SAP Material
8778481	WEST C-0047461596-000	200594690

**Confirmation of Report Content 報告確認**

The Stage-2 Verification for the year 2017 of the New Infrastructure of the West Coast Expressway from Badunliao to Jiukuaicuo managed by West Coast Expressway Southern Region Temporary Engineering Office was completed.

本次對 貴組織所管理的西濱快速道路八棟寮至九塊厝所進行之第一階段審查業已完成。

Please sign below confirming acceptance of the Verification reports contents (Report number/s):  
請簽署確認同意報告(編號)中的內容:

**8778482**

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Signed for on behalf of BSI

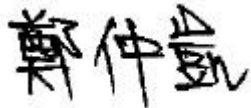
BSI 代表簽署

Signed for on behalf of the client

客戶代表簽署

Chung-Kai (Ivan) Cheng

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August 25, 2017

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SMO	Functional Location	SAP Material
8778482	WEST C-0047461596-000	200594690